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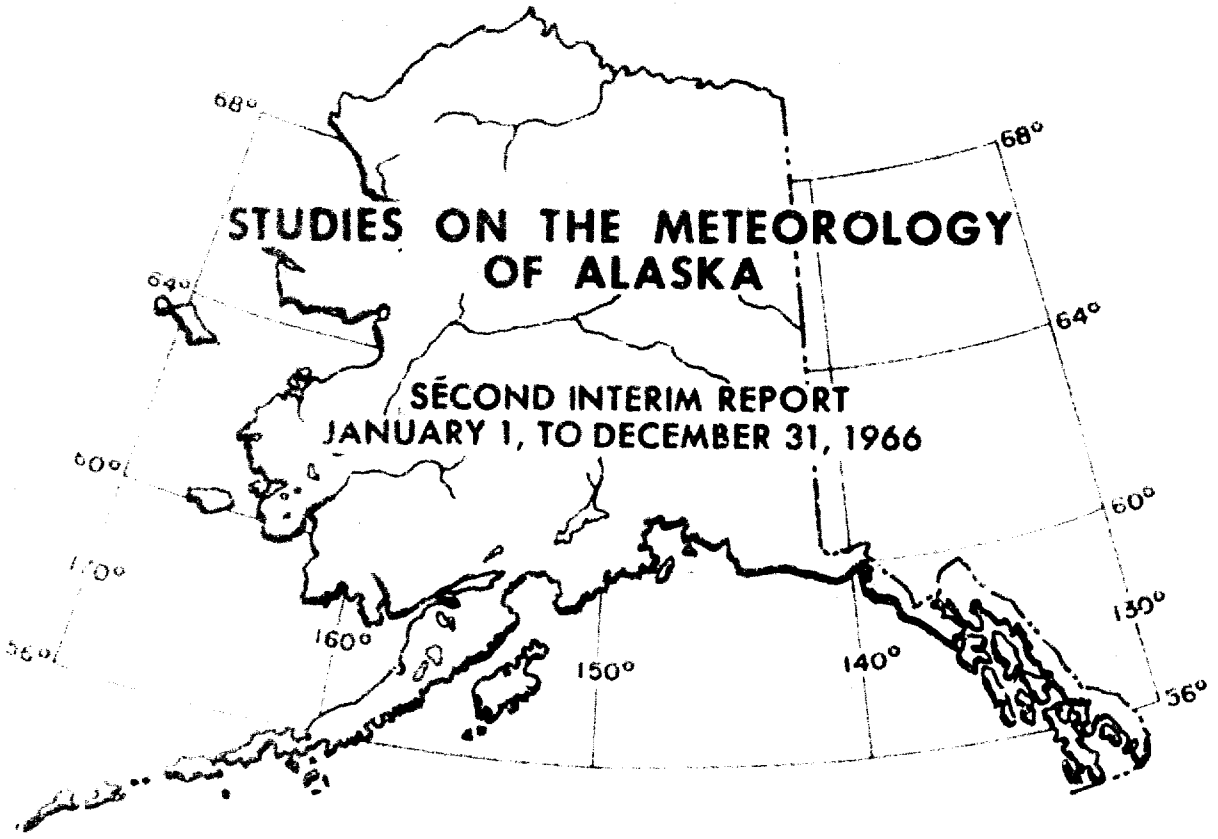

STUDIES ON THE METEOROLOGY OF ALASKA

SECOND INTERIM REPORT
JANUARY 1, TO DECEMBER 31, 1966

MAY 1967

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EXTREMELY COLD WEATHER SPELLS

IN ALASKA

SECOND INTERIM REPORT

January 1 - December 31, 1966

Department of the Army Task No. 1V0-14501-B53A-05-03

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EXTREMELY COLD WEATHER SPELLS IN ALASKA

1. INTRODUCTION

The circulation patterns and synoptic processes associated with periods of very low temperatures in Alaska were examined from the view point of synoptic climatology.

The study is based mostly on monthly and daily temperature data obtained from meteorological stations in Alaska during the period 1948 - 1964 (5,6) and upon analysis of the synoptic charts presented by the Polar Weather Maps publication, U.S. Weather Bureau (4).

Individual months, with extremely low mean monthly temperatures, were selected for detailed analysis from series of observations within the above mentioned period. These months were: December 1957, January 1960, and February 1950.

2. OBSERVATIONS

Having collected the series of meteorological data for as many stations as was possible, we have reproduced them in consolidated tables for each winter month separately, for the sake of regional comparison, and to determine, in a first approximation, to what degree can the lowest negative departures from the average value coincide in time over various regions of Alaska. The map on Figure 1 shows the station network which is used in this study.

DECEMBER 1957

Atmospheric Circulation

In the temperate zone of the western half of the Northern Hemisphere, the intensity of atmospheric circulation was rather high in this month.

The increased circulation in December 1957 represented a marked change from the preceding season, which had a persistent low circulation regime during all three months of it.

Blocking conditions prevailed during the fall in the temperate zone, and it was not until late in November that the westerlies began a steady increase in intensity to above normal values, which were reached in December.

For the whole area mentioned above, between the latitudes of 35° - 55°N, the mean values of the zonal index at 700 mb surface showed the following departures: September 1957 -0.6; October -2.2; November -1.4; and December +1.4. The normal values for these months are respectively: 7.8; 9.5; 10.5; and 11.3 meters per second (1).

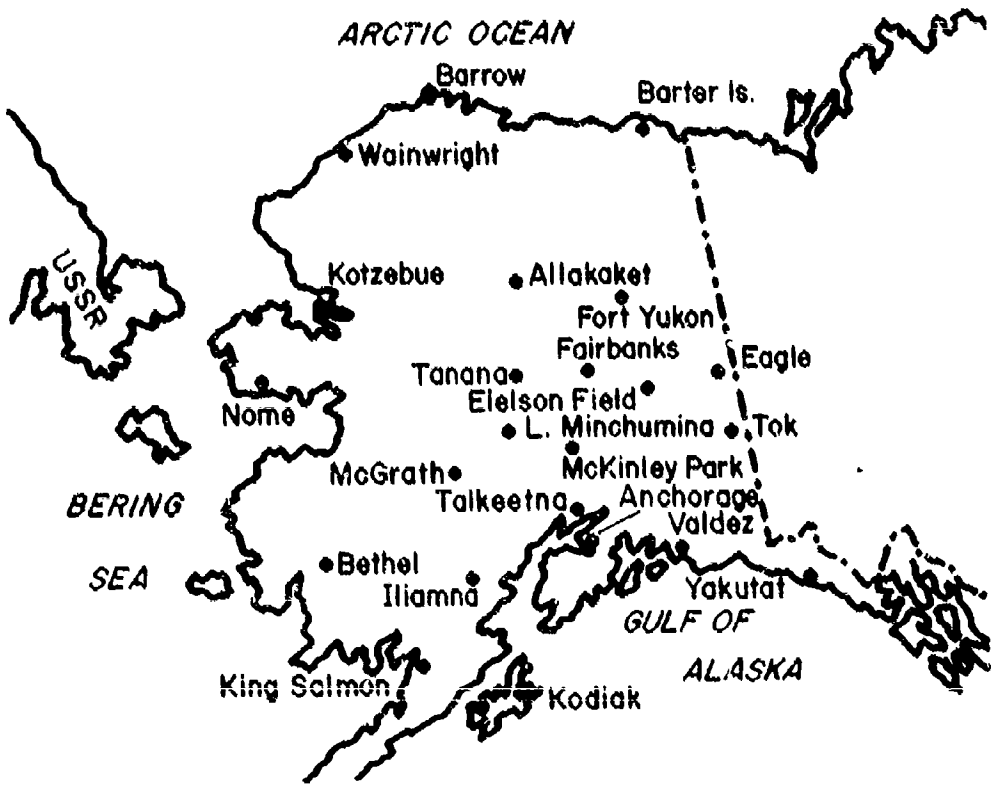

Figure 1. Station network.

In Alaska south of Brooks Range a prolonged period of mild, cloudy weather continued into the first half of December 1957. The mild temperatures were brought about by well developed Lows persistently crossing the region from Eastern Bering Sea into the Western Gulf of Alaska.

The Lows maintained a warm and moist air flow over almost all of the Alaskan Mainland during the fall and up to the second half of December 1957. In this warmer period, in December, the Arctic High was centered far north off the Bering Strait, mostly at the latitudes of 80° - 85°N (Figure 2).

Being located that far north, the Arctic High succeeded in affecting only the Arctic Coastal Regions of Alaska, where the only subnormal temperatures appeared in the first half of December 1957.

At Barrow, the mean daily temperatures were about 6°F below the daily normals for the first nine days of December 1957. Barter Island recorded even a stronger cooling, showing daily temperatures slightly lower than those at Barrow, dropping to -33°F at mid-December. (See Supplement Tables).

Synoptic chart for December 5, 1957, 0000Z, shown on Figure 2, is characteristic for the first half of December. The chart shows a large Low over the Bering Sea with a well expressed front in its eastern section over the southern part of Alaskan mainland and over the Gulf of Alaska. The Arctic High is centered far north at about 85°N 170°W. The anticyclonic field covers only the northern fringes of Alaska.

There are no continental Highs in the picture. Canadian High pressure area is too far in the east, and the East Siberian High is represented only by a weak ridge centered over 150° - 160°E, also far away from the region under study.

The general pressure pattern changed in the middle of the month permitting the Arctic air from the well established Arctic High to spread over the mainland, bringing much below the normal temperatures to practically all stations in Alaska.

The upper air maps, reproduced on Figures 3 and 4 from source (2), show the pattern of air flow for November and December 1957 at about 10,000 ft. The contour lines represent the mean height of the 700 mb level; figures are in tens of feet. The maps were reproduced in a smaller model from Charts by Extended Forecasting Section, U. S. Weather Bureau

The comparison of the mean contour maps for November and December 1957 (Figures 3 and 4), shows that the center of the Arctic High was located closer to Alaska in the month of December than it was in November, and correspondingly the influence of the Aleutian Low decreased.

On the surface, a marked cyclonic center dominated the region of the Gulf of Alaska moving inland over the North American continent, entering British Columbia and undulating east and south eastward, advancing between Lake Superior and Hudson Bay, mostly along the normal track for the month of December.

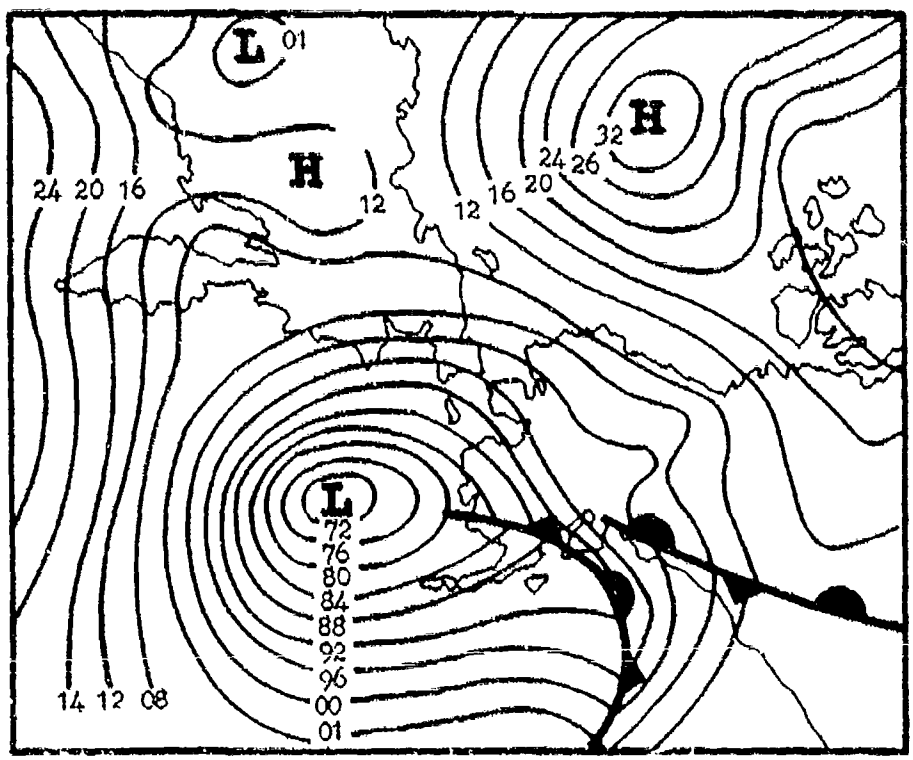

Figure 2. Surface chart for December 5, 1957 (0002)

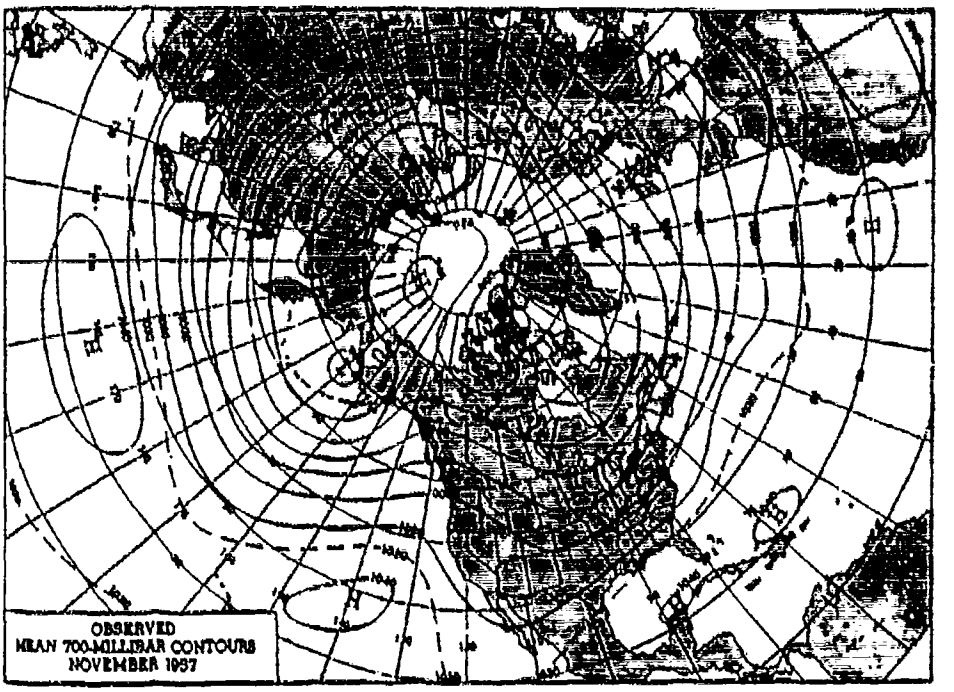

Figure 3. Mean 700 mb contours November 1957 (2)

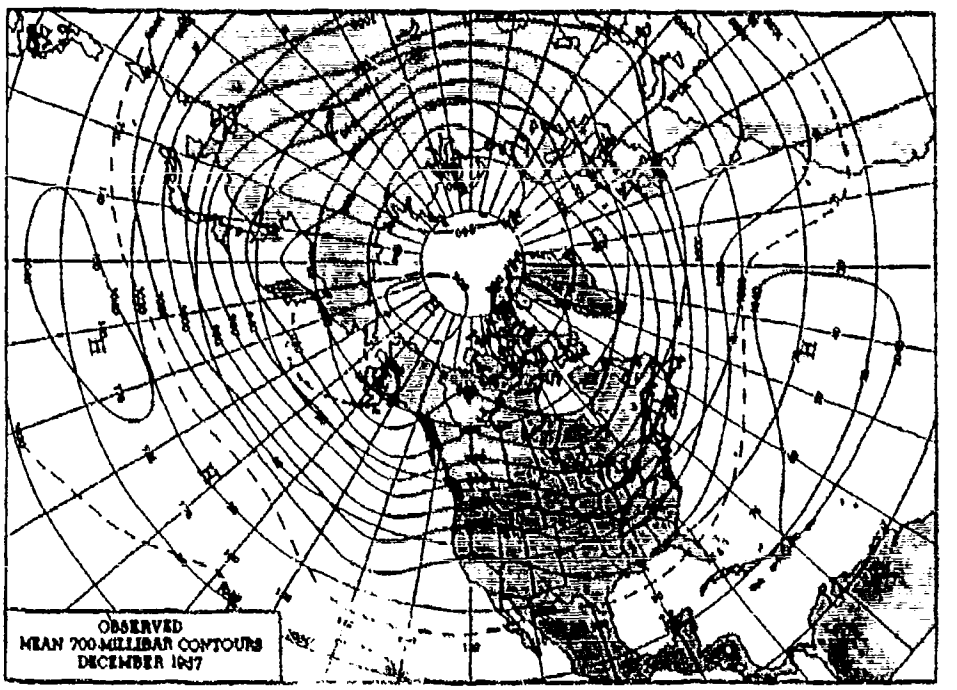

Figure 4. Mean 700 mb contours December 1957 (2)

More details in the pattern of circulation could be seen on the surface charts for the Northern Hemisphere, USWB, from which a fragment covering the area of Alaska and adjacent regions is reproduced in figures 5-10, (5).

The map for December 15, 1957, (Figure 5: 16 December 1957, 0000Z), shows a large Arctic High centered at about 78°N, 170°E. The anticyclonic field covers the northern half of Alaska, while the southern half is under a weak cyclonic field of the Low centered over the Gulf of Alaska.

On December 16, 1957, (Figure 6), the same Arctic High dominated the northern half of Alaska. Its center moved a little closer to Alaska shifting in a southeasterly direction. The center of the Low in the Alaska Gulf moved in the same direction, southeast, but at the same time it intensified considerably, so that the region that had the day before a pressure of 1000 mb, was now under the 984, 988 and 992 isobars. Besides, the pressure gradients in the southeastern portion of Alaska had grown much stronger.

On December 17th, the center of the Arctic High was found in a much more northern position, with pressure gradients becoming weaker in this system. On the other hand, the center of the low in the south, shifted back in a northwesterly direction and was found on this day almost in the same position it was two days before, keeping rather strong gradients with the central pressure only slightly higher than it was a day before.

On December 18, (Figure 7), the Arctic High Center was found farther north at about 83°N occupying the furthest northerly position that was recorded during the entire cold period under study, while the low center stayed almost in the same place as it was the day before, with the same central pressure of 984 mb. However, another development was taking place at the same time: a strong ridge of high pressure extended in the northeastward direction from East Siberia. The cold flow from the East Siberian Center reached the Arctic High Center, building a powerful ridge of high pressure over the Arctic Ocean in the region just north and northwest of Alaska.

On December 19th, the Arctic High pressure center moved slightly to the east and so did the East Siberian High. Most of the regions in Alaska felt the strong influence of both high pressure areas, while the Low in the Gulf of Alaska was rather stationary, affecting the weather only in the southern coastal regions. In the major part of Alaska the pressure gradients were weak and a strong radiative cooling took place in most regions, especially in the Arctic Drainage Area and in the Yukon Valley.

On December 20th, the Arctic High remained almost in the same place, but the East Siberian High moved a great deal eastwards, centering now in the area between Kamchatka and Vrangel Island, much closer to Alaska. No changes in the position of the Low in the Gulf of Alaska were noticed. The minimum at Barter Island was -44°F, while Barrow had a much higher minimum of -24°F. The big difference in minimum temperatures between the two stations could be explained by the effect of local conditions, since the sea in the vicinity of Barrow has oftentime open water surfaces between the ice covered areas even in the middle of the winter season, that in turn may have produced fog or low clouds protecting the place from radiative cooling.

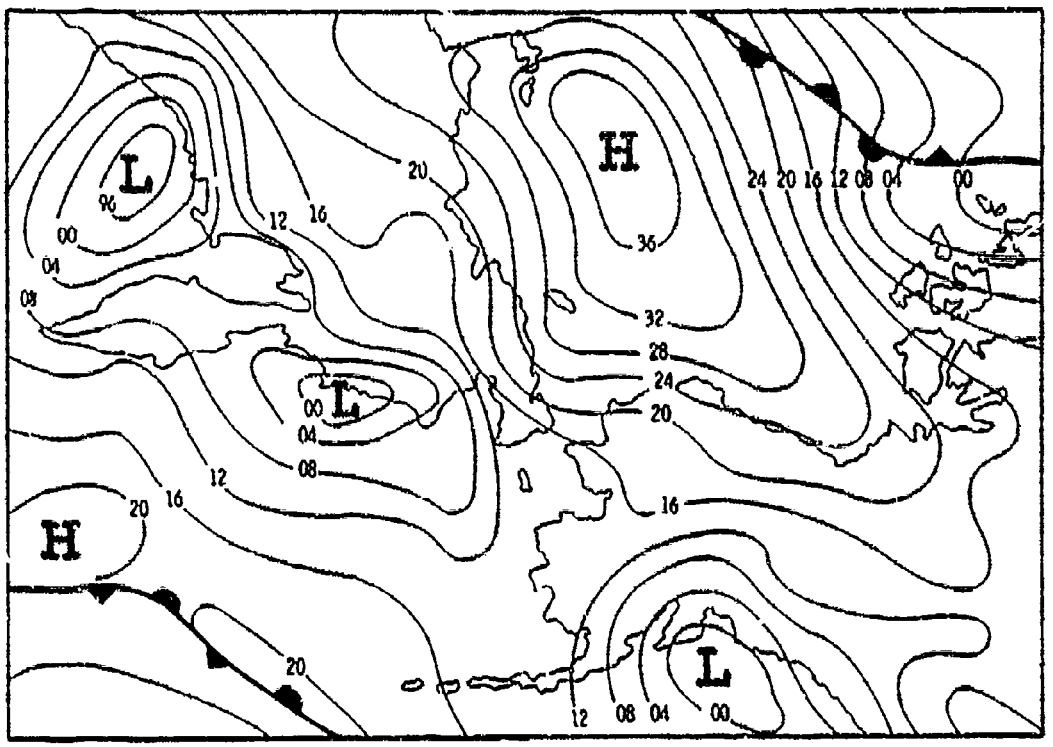

FIGURE 5. 16 DECEMBER 1957 (0000Z)

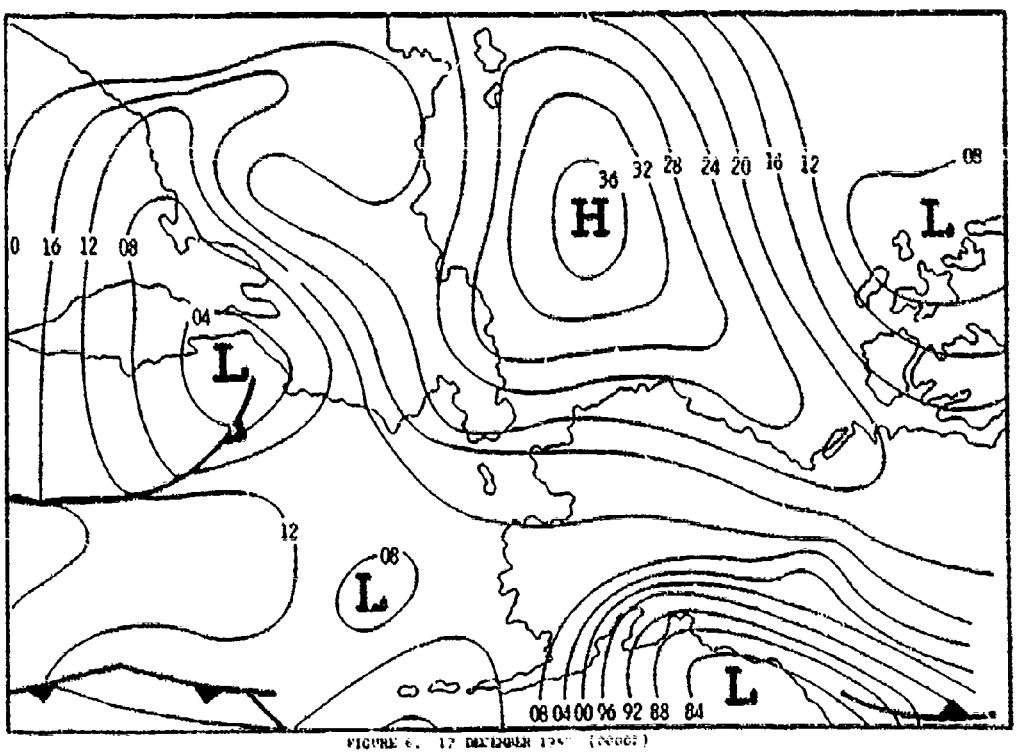

FIGURE 6. 17 DECEMBER 195[illegible] (0000Z)

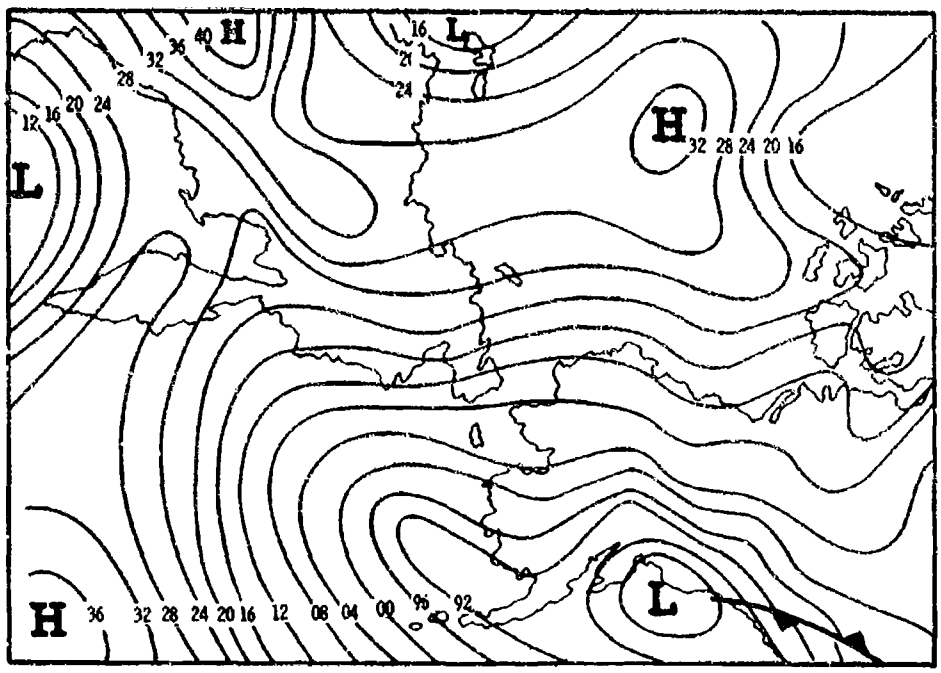

FIGURE 7. 19 DECEMBER 1957 (0000Z)

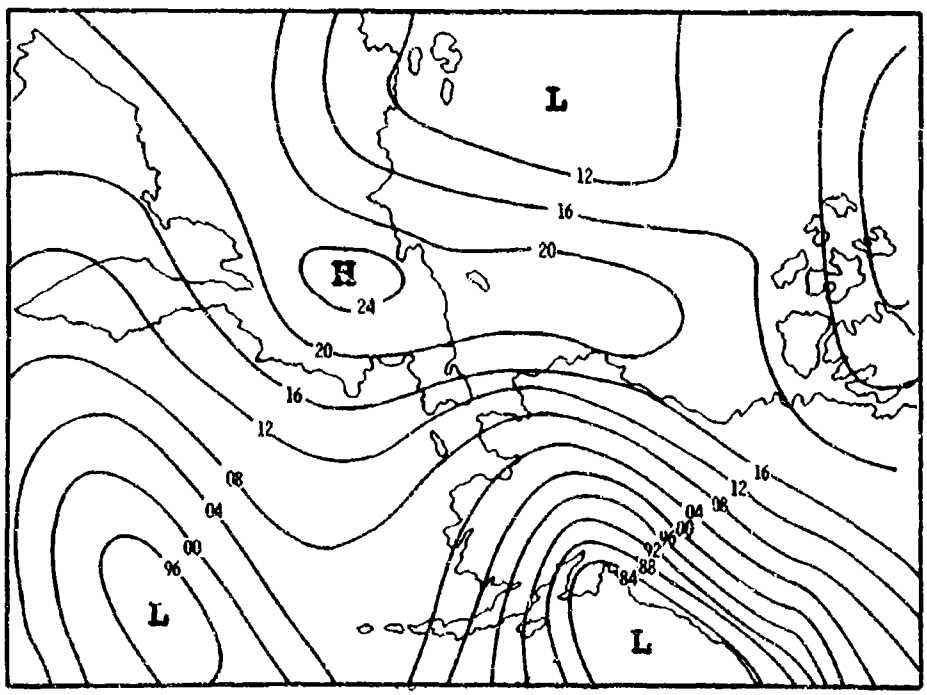

FIGURE 8. 23 DECEMBER 1957 (0000Z)

In Yukon Valley the minimums were still lower in some locations like Galena (-48°F) and Tok (-50°F), which of course shows the influence of local relief, that favored both the stagnation of cold air and the intensification of radiative cooling.

On December 21st, the Arctic High and the East Siberian High have merged into one high pressure system with the isobar of 1024 mb closing an elongated pressure center of a rather large extent, with the middle point in the region of Vrangel Island. However, the intensity of this system decreased. There was not much change in the location and intensity of the low over the Gulf of Alaska. The minimum temperatures in the northern part of Alaska remained of the same order as before.

On December 22nd, (Figure 8) there remained only a relatively weak high pressure ridge stretched from East Siberia northeastward. The Low in the Gulf of Alaska still strongly influenced the area.

On December 23rd, the high pressure ridge, that was seen on the chart the day before extending from the East Siberian High had broken up into two high pressure area. One of them was centered over the Arctic Ocean just off the middle section of the northern coast of Alaska. The East Siberian Anticyclone receded somewhat inland with the center just north of the Okhotsk Sea Coast. The Low of the Gulf of Alaska shifted somewhat closer to the middle section of the southern coast of Alaska. The cooling continued during the day, becoming stronger. In some locations the lowest temperatures for the month were observed on this day.

On December 24th, (Figure 9), the high pressure area that was centered just off the northern coast of Alaska moved southeastward to Canada and at this day was centered at about 70°N, 115°W. The Low in the Gulf of Alaska moved slightly closer to the coast, but weakened somewhat with the central pressure rising from 980 to 992 mb.

December 25th, the East Siberian High pushed eastward closer to Alaska and its field dominated now the major part of the Alaskan mainland. Its pressure rose by 4 - 8 mb, but the gradients were generally weak. The Canadian high center remained where it was the day before, but was connected now with the East Siberian High by a ridge of high pressure over the Arctic Ocean just off the northern coast of Alaska. A ridge of high pressure extended from this center westward covering the northern half of Alaska and bringing very cold air to the western and southwestern regions, effecting the lowest minimum temperatures for this month at the stations: Galena (-54°F), Bethel (-59°F), Tok (-53°F), and Wild Lake (-47°F). The east Siberian High moved eastward closer to Alaska. The low pressure center in the Gulf of Alaska was pushed southeastward away from the southern coast, while a new Low was formed south of the Aleutian Islands, with the central pressure of 972 mb, and was moving fast toward the Gulf of Alaska.

December 26th. The East Siberian High moved somewhat back inland, while the Canadian High remained at the same place. Both areas of high pressure have intensified somewhat and the northern half of Alaska remained under their anticyclonic field with rather weak gradients. This day brought the

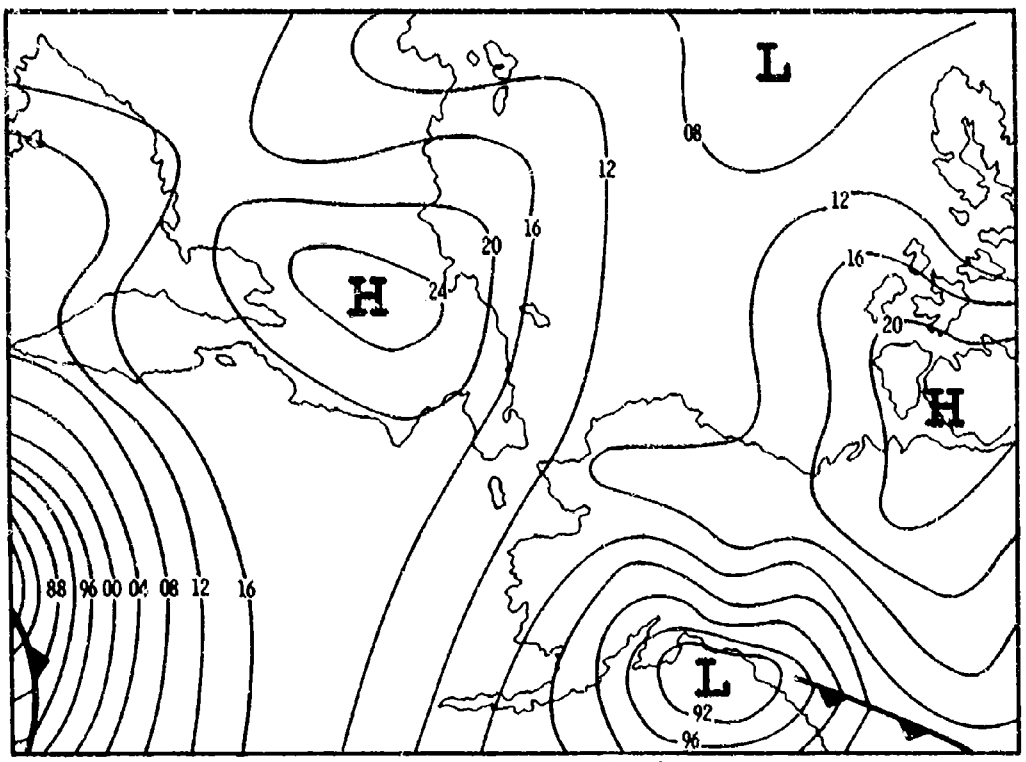

FIGURE 9. 25 DECEMBER 1957 (0000Z)

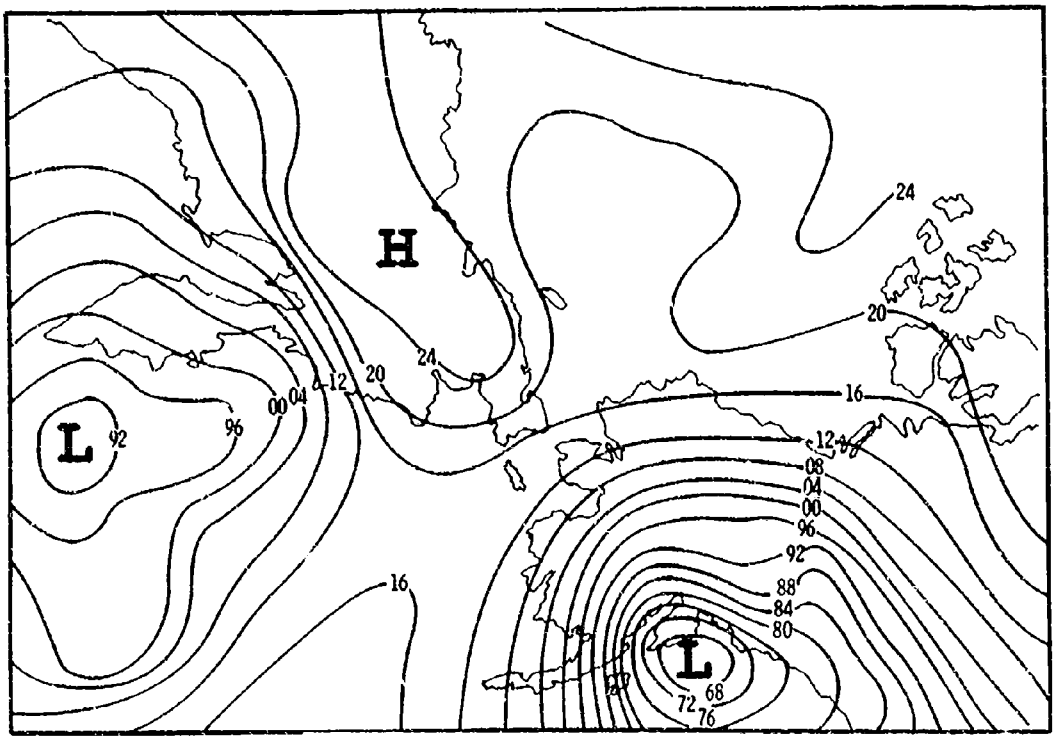

FIGURE 10. 26 DECEMBER 1957 (0000Z)

lowest minima of temperature for the month in the following stations: Barrow (-45°F), Kotzebue (-47°F), Fairbanks, (-45°F), Wainwright (-44°F).

December 27th, (Figure 10). The East Siberian High weakened a little, while the Canadian High pressure area disappeared from the map, leaving in its place only a very weak gradient field. A large and deep Low now covered the major part of Alaska. It was centered just off the southern coast of Alaska, with the central pressure as low as 968 mb. Under the influence of extensive inflow of warm air from the Pacific, the temperature rose on this day almost everywhere in Alaska. The increase was quite considerable in some regions of the southern part and only very slight in the northern half of Alaska where the very cold period continued up to the end of the month.

December 28th. The anticyclonic field extended further south over Alaska, pushing the low pressure field away from the southern coast and at the same time filling up the cyclonic center to a considerable degree, with the central pressure in this system rising from 968 to 984. The East Siberian High remained pretty much in the same position and of the same intensity. A large cyclonic system emerged in the Bering Sea with central pressure of 964 mb. The temperature continued to rise almost everywhere, even at Barrow and Barter Island. The minimum temperatures were higher by 6 - 8°F than the day before. However, in the protected locations of Yukon Valley the minima were lower than yesterday and the cold spell was still going strong in the northern half of Alaska.

December 29th, anticyclonic field of very weak gradients covered the northern half of Alaska. The East Siberian High was intensified somewhat and its center moved a little closer to Alaska. In this field of weak gradients, the temperature continued to be very low and the minima were of the same order as the day before. The large Low over the Bering Sea moved closer to the low pressure area in the Gulf of Alaska, which in its turn moved toward it. In the interior the temperatures dropped again (Fort Yukon, Tanana, Fairbanks, Eagle, Galena, Eielson Field, Lake Minchumina, McKinley Park, Tok, McGrath and Kotzebue).

On December 30th, the influence of the Low centered south off the coast of Alaska increased and the temperature rose in the southern coastal regions (Talkeetna, Anchorage, Valdez, Yakutat, Kodiak). The other regions of Alaska, however, were not affected by the warm air.

On December 31st, a ridge from the east started to dominate the northern coastal region of Alaska. During the afternoon and the night a separate high pressure center built up off the north shore of Alaska. This high pressure system influenced, however, only the north and northwest coast where temperatures dropped (Barter Island, Barrow, Wainwright, Kotzebue). At other areas the temperatures increased.

Summarizing the events during the very cold spell of weather in the second half of December 1957, the following circulation patterns can be distinguished:

At the beginning of the cold period the largest, northern part of Alaska was strongly influenced by an Arctic High with the center undulating in the region

of the 180° meridian between the latitudes of 75° and 80°N during December 15, 16 and 17 (Figures 5 and 6). The southern coastal region was influenced by a Low which has even deepened from 15th to 16th of December. Its center was off the south coast of Alaska. However, this cyclonic circulation also brought to the southern part of Alaska a cold Arctic air via Canada.

During the next five days, December 18 - 22, the influence of cyclonic circulation in Alaska increased, but as in the previous days, this circulation also brought mostly cold Canadian air except in the southern coastal region. On December 19th - 20th, a high pressure center moved from Eastern Siberia eastward and on the 21st this center merged with the Arctic High, building an elongated center stretched from SW - NE over the Vrangel Island (Figures 7, 8).

In the next days up to the end of December the lowest temperatures were recorded at various sites in Alaska. On the synoptic map of December 23rd two high pressure centers are recognizable: one centered off the NW coast of Alaska which influenced the northwestern part of Alaska, and another over East Siberia. However, the influence of the Low centered off the south coast of Alaska was still very strong.

On December 24th both of the high pressure centers moved eastward, and the influence of the Canadian High strengthened; at the same time the influence of the Low centered off the south coast, decreased (Figure 9). On December 25th and 26th the Low deepened again, but influenced only the south coastal region; Alaska was mostly dominated by the Canadian High. On December 27th, the Low deepened markedly and influenced almost the whole area except the northwestern corner of Alaska (Figure 10). In the next two days, December 28th and 29th, the influence of the High centered west off Chukotka Peninsula increased, and only in a circulatory way was the southern coastal region of Alaska affected by the Low. On December 31st, a ridge stretching from the east started to influence the northern part of Alaska.

We can conclude that the low temperatures in the second half of December 1957 occurred principally due to an inflow of very cold Arctic air, mostly from the high centered over the Arctic Archipelago, and from the East Siberian High. The cold air stagnated over the Northern Drainage Region due to the local orographic effect, which increased the radiational cooling and also contributed to the creation of very low temperatures.

Temperature Regime

The monthly variation of mean daily temperatures for December 1957 obtained from the observations at Barrow shows only 9 days with temperature above the normal value for this month. (Figure 11)

The mean monthly temperature for December 1957 was lower than the normal value, obtained from the period 1948-1964, by 6.4°F.

The lowest mean daily values were observed on the 25th-27th of December, when the synoptic charts showed an active anticyclonic center over the Canadian Archipelago, NE from Alaska. From this center, an influx of very cold air-

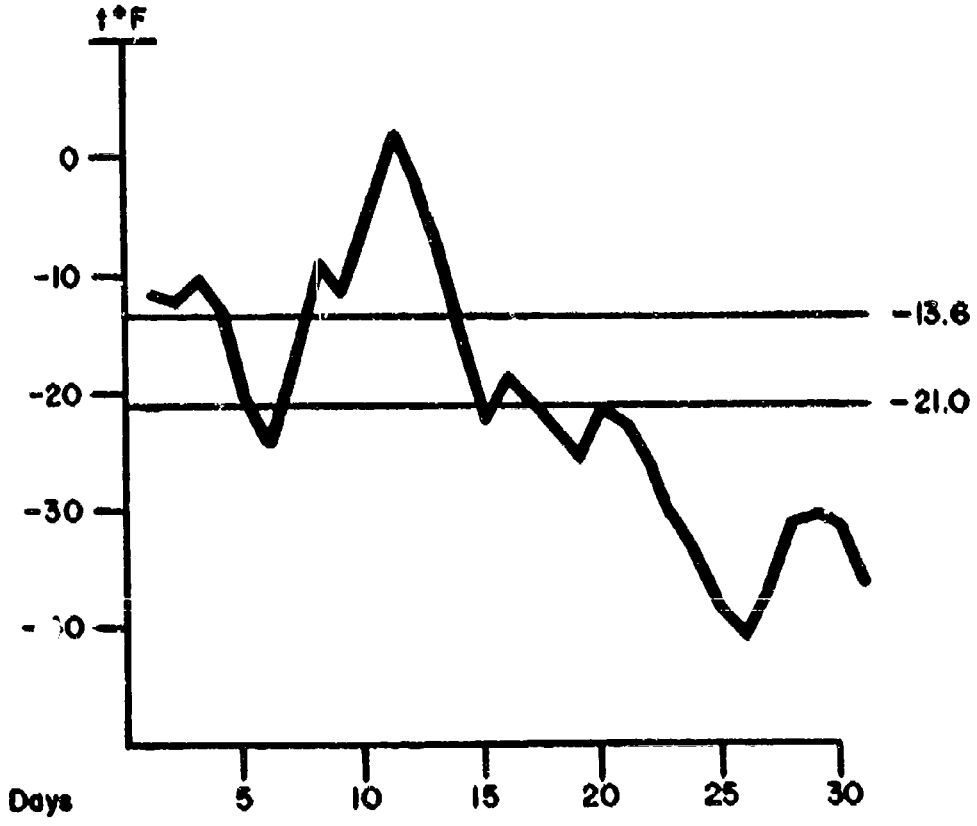

Figure 11 Mean daily temperatures for December 1957 at Barrow.

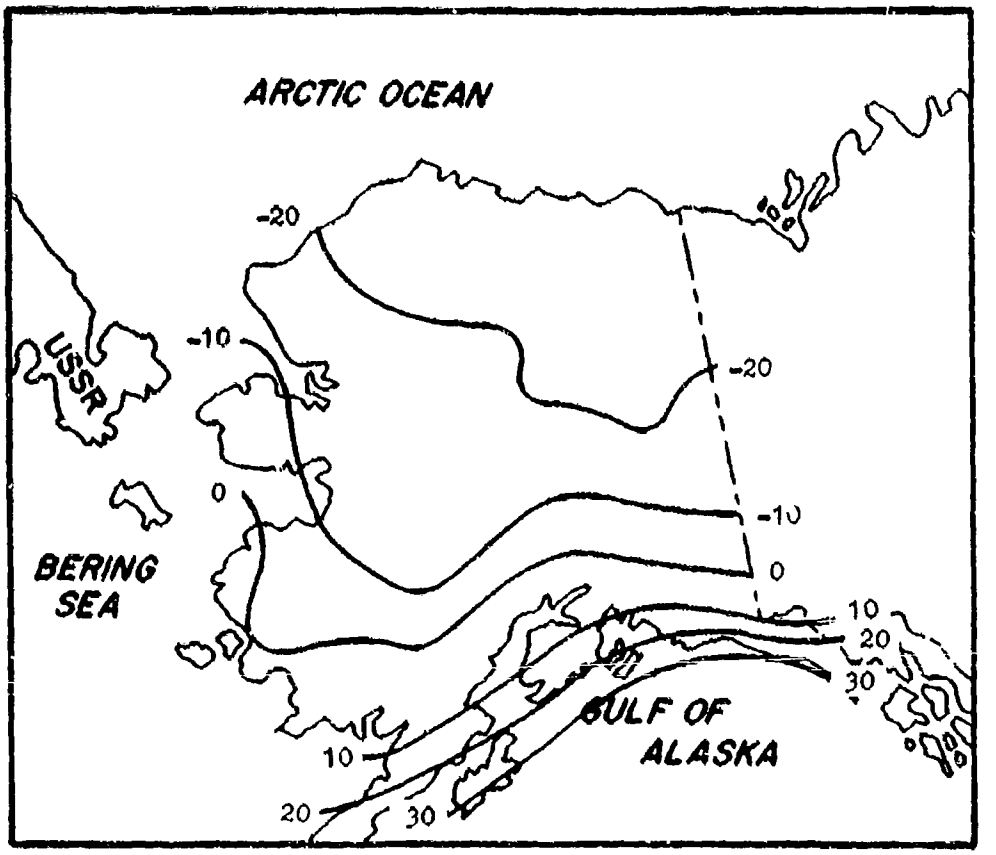

Figure 12. The distribution of mean monthly temperatures in December 1957.

masses flowed into Alaska from NE, sending the mean daily temperatures down to -40°F, which occurred on the 26th of December.

Analyzing the distribution of mean monthly temperatures over Alaska in December 1957, which is presented on Figure 12, it can be seen that the general pattern of isotherms in this very cold month resembles, to a high degree the direction of the normal pattern, which is presented on Figure 13. If, however, we analyze the quantitative distribution of temperature in this very cold December, the major portion of Alaska shows temperatures about 10°F below the normal values. Only two rather small regions deviate from the general pattern and show some peculiar features. These are: the SE region, which had almost normal temperature, hardly experiencing the influence of the cold air, and the SW area, which had unusually cold temperatures with departures from normal values almost as large as the coldest area in the NE (about -9°F).

The distribution of the lowest temperatures, presented on Figure 14, shows an elongated area that stretches in a general direction from NE to SW across Alaskan Mainland with minimum temperatures of -50°F and lower. The lowest values were observed in the upper reaches of the river Koykuk, where the lowest temperature sank to -60°F.

The departures of the mean monthly temperatures of December 1957 from the mean values derived from the period 1948-1964 indicate a peculiar distribution pattern, which is shown on Figure 15.

The largest departures, which were of an order of -9°F, were observed in the furthest NE region and in the furthest SW area.

The interior regions of the Yukon Basin had moderate departures of -5°F, while the smallest departures, though still of negative nature, were recorded in the SE region of Alaska where the temperature departed only -1°F from the long term average.

Upper Air Temperatures

The vertical structure of the atmosphere under conditions of very cold weather was studies from available data of radiosoundings.

The Russian Drifting Station "North Pole -7" drifted in the Alaskan section of the Arctic during the winter of 1957-1958. Upper air observations of this station were analyzed by Geigerov (3), who presented a time-cross-section with thermoisopletes, which is partially reproduced here in Figure 16.

Using the data presented by isopletes on Figure 16, a vertical profile of mean monthly temperature distribution for December 1957 has been constructed and shown on Figure 17 by the heavy line.

This profile shows the dimensions of the surface inversion, the average lapse rates, and the position of the tropopause. It can be seen that in the lower 500 m the temperature increased with height at a rate of about 1°C/100m. The average height of surface inversion was about 2 km. At 3.6 km the temperature

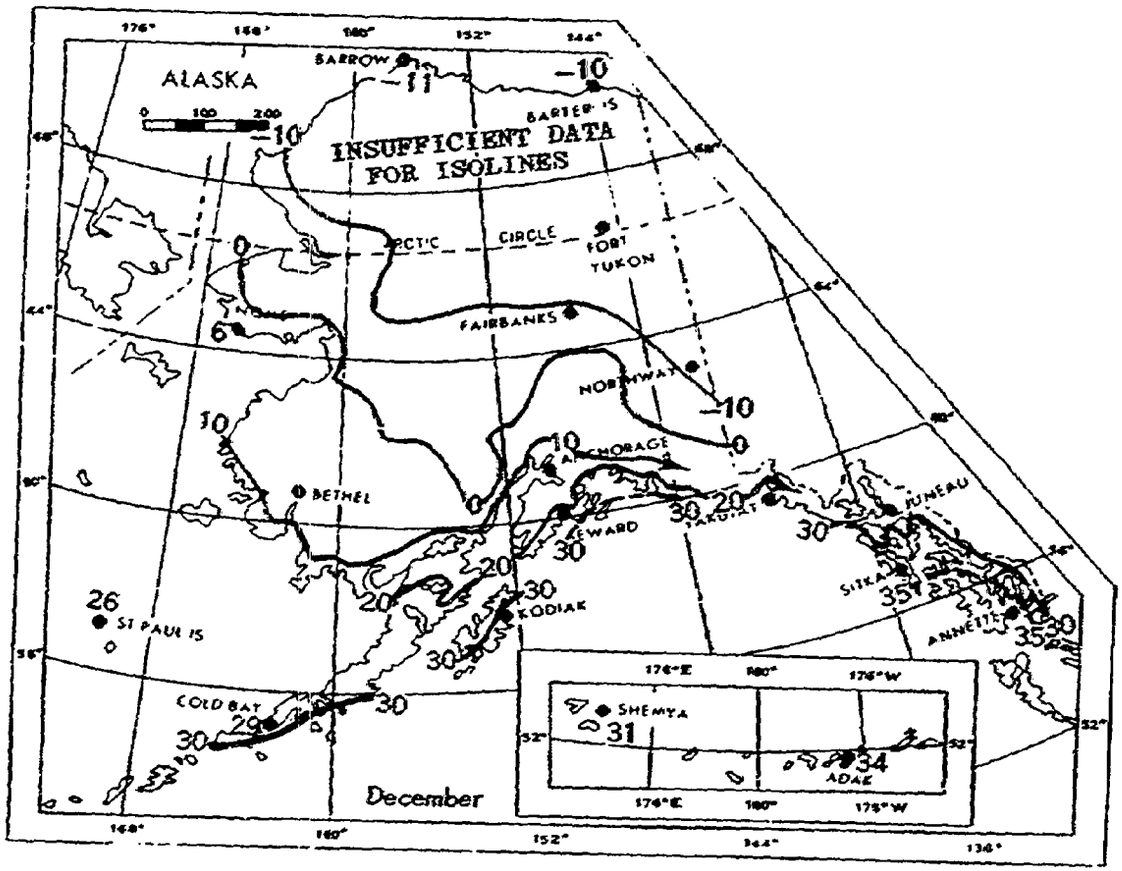

Figure 13. Mean monthly normal temperatures for December (1931-1960).

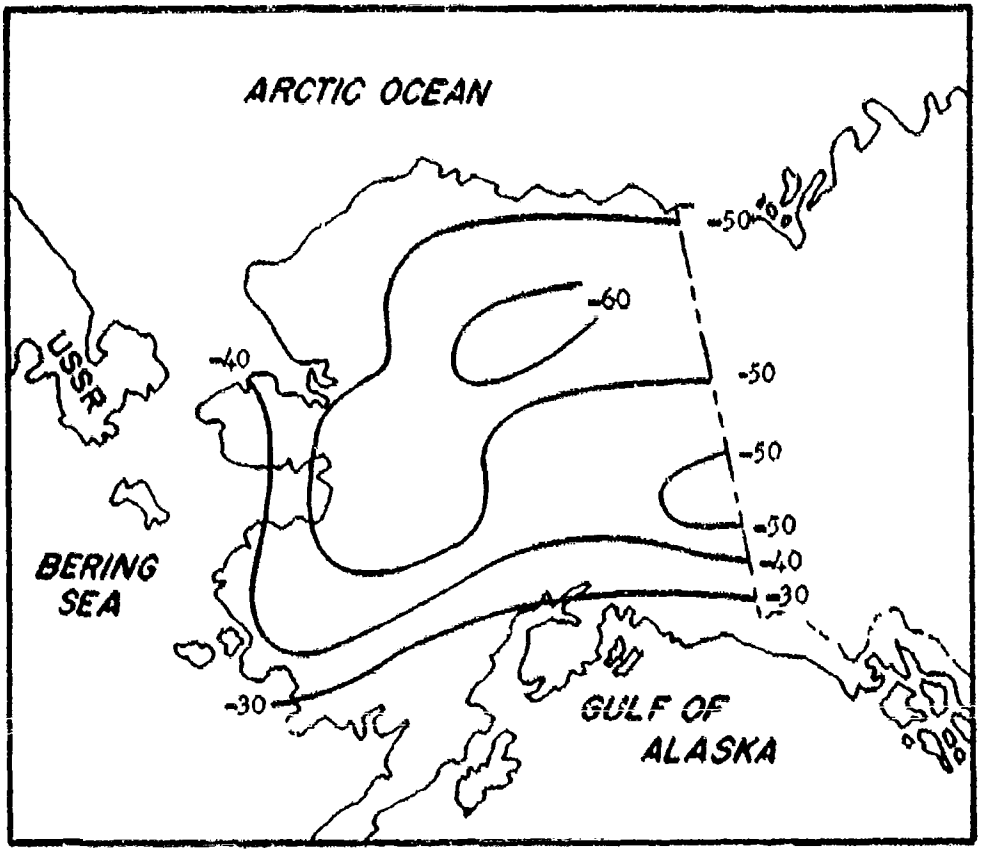

Figure 14. The lowest temperatures for December 1957.

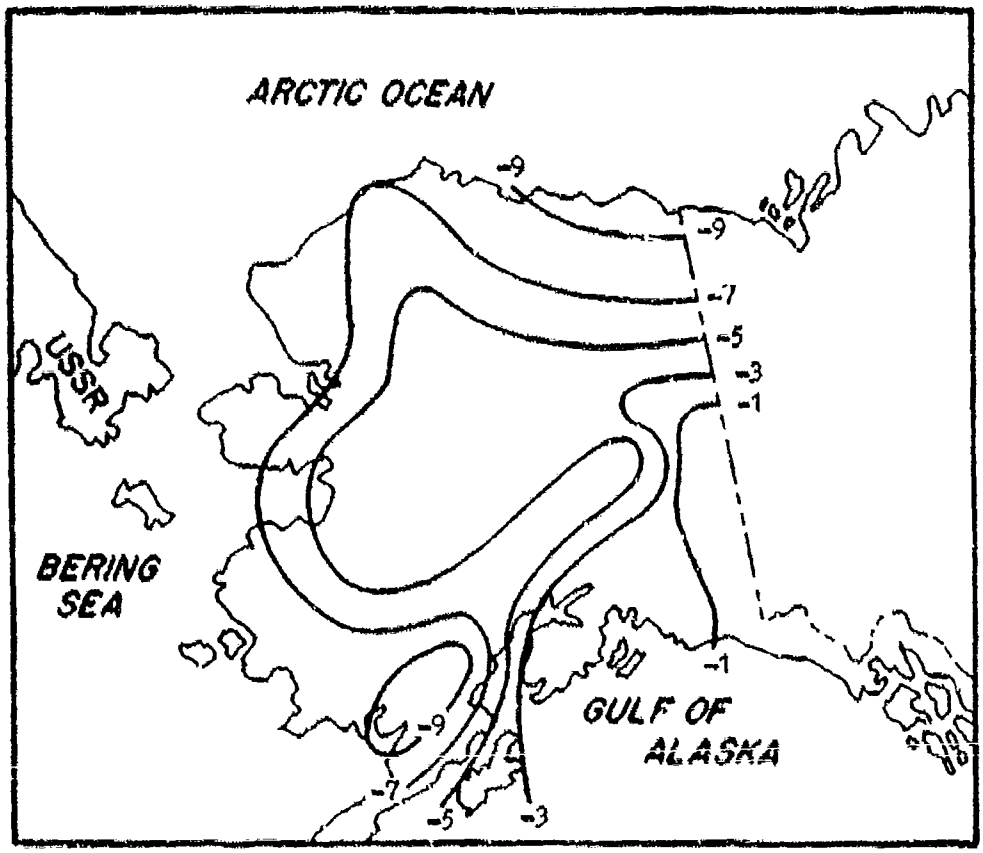

Figure 15. Departures of mean monthly temperatures of December 1957 from the normal value derived from 1948-1964.

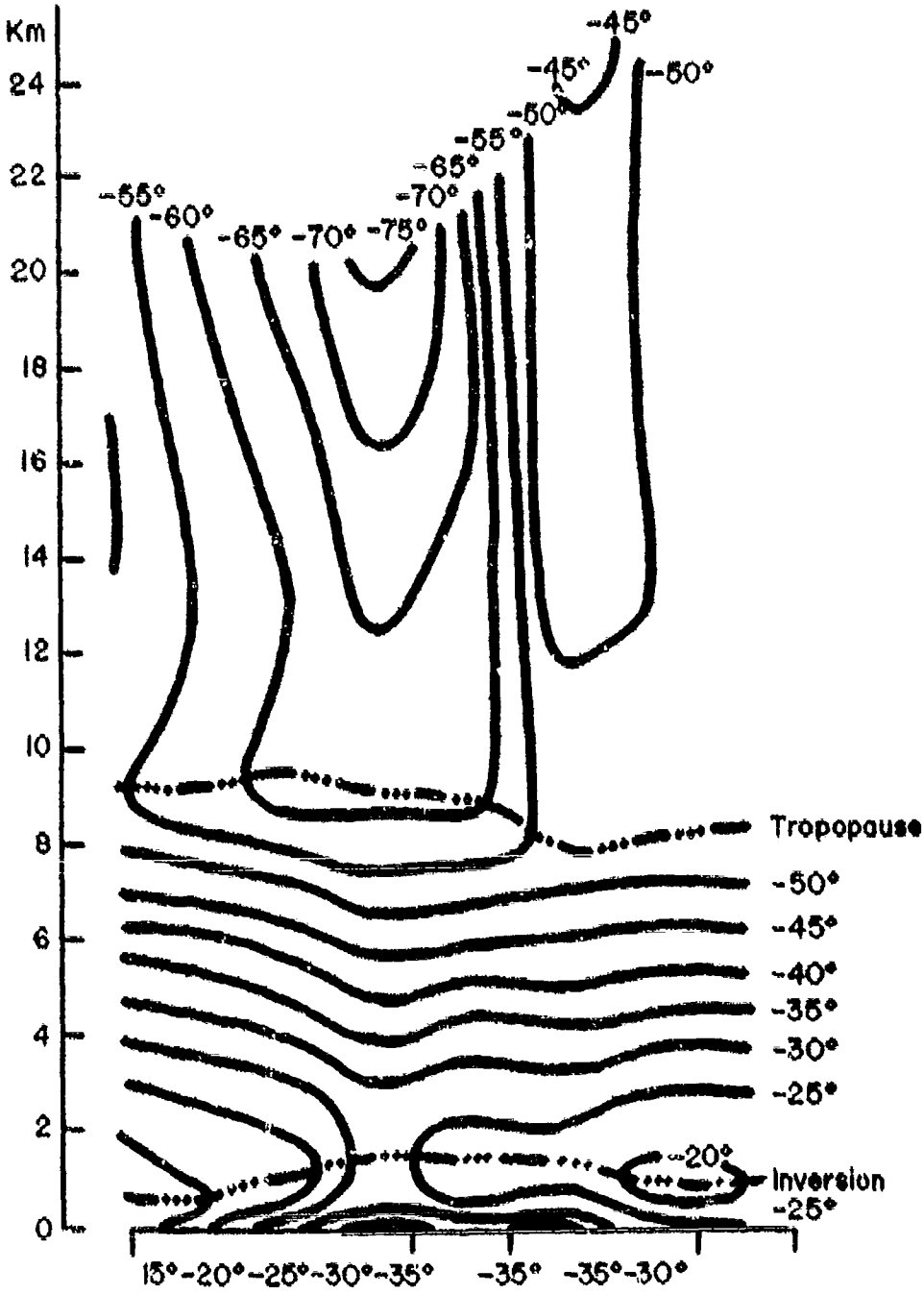

Figure 16. Thermoisoplotes for winter 1957-1958
Drifting Station "North Pole - 7" (4)

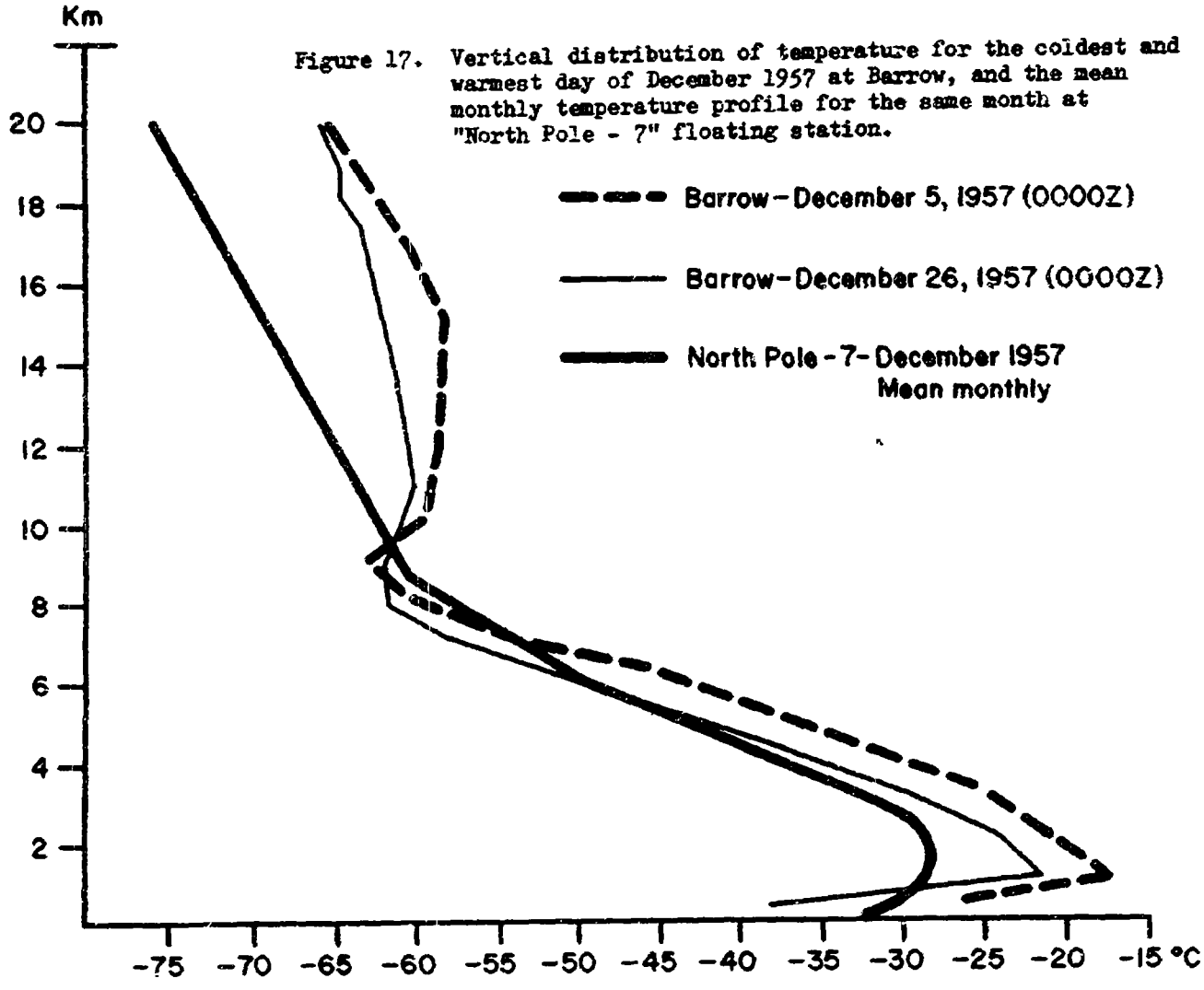

Figure 17. Vertical distribution of temperature for the coldest and warmest day of December 1957 at Barrow, and the mean monthly temperature profile for the same month at "North Pole - 7" floating station.

in the troposphere reached the value observed at the surface and from that altitude it decreased more or less regularly at an average lapse rate of about 0.5°C/100 m in the troposphere. The tropopause was located at about 8.6 km. Above the tropopause the lapse rate changed to an average of about 0.14°C/100 m. The temperature reached -75°C at an altitude of about 19,500 m.

For comparison with this mean profile at "North Pole - 7", two other radiosoundings taken at Barrow in December 1957 are presented. One of them was taken on December 5th, just before the extremely cold period had set in, while the second radiosounding represents the vertical distribution of temperature on a very cold day in the middle of the very cold spell on December 26th, 1957. (Figure 17).

The comparison of these two ascents shows: 1) the height of the surface inversion was approximately the same (1 km) on both days, but the intensity of surface inversion was greater on the colder day - as expected. 2) the height of the tropopause was about 9 km on the warmer day and 8 km on the colder day, 3) the temperature lapse rate in the troposphere (2-8 km) was approximately the same on both days; 0.7°C/100 m, 4) the temperature in the troposphere was about 5°C lower on the coldest day, as compared with the warmest day, 5) the temperature of the stratosphere up to 20 km was about 2 - 4°C lower on the colder day.

A comparison between the mean conditions in the Central Arctic, as derived from data of "North Pole - 7" in December 1957 and the conditions on the colder day of December in Barrow (the 26th) shows that in the layer up to 6 km height, the temperatures were a little lower over the Central Arctic (except the surface inversion layer); between 6 and 9 km the atmosphere was colder over Barrow on December 26th. Significant is the circumstance that the lower stratosphere was much colder, on the average for the month, over the Central Arctic in comparison to the coldest day of December in Barrow and the difference in temperatures apparently increased with height; so at 20 km the mean temperature over the Central Arctic was 10°C lower than over Barrow on the coldest day of December 1957.

So it can be stated that generally, on the northern coast of Alaska in an extremely cold December of 1957, the vertical structure of the atmosphere showed a colder surface layer than in the Central Arctic, in the region of the "North Pole - 7" it also showed sharper inversions, slightly larger lapse rates in the troposphere and much warmer stratosphere, while the heights and the temperatures of the tropopause were very much alike.

JANUARY 1960

Circulation of the Atmosphere

January 1960 is characterized by a cold spell in the middle of the month. However, the northern coastal region of Alaska showed subnormal temperatures for almost the whole month. January 1960 was the coldest on record at Barter Island and the second coldest at Barrow and Wainwright for the period 1948 - 1964, with mean monthly temperatures -27.3°F, -24.8°F and -23.7°F respectively. The southern part of Alaska, however, had average temperatures above normal for this month.

On January 9th, Alaska was influenced by a trough stretched over the country in zonal direction. The easterly and northeasterly winds in the northern coastal region brought cold arctic air. This circulation was strengthened at northwestern shore by the anticyclonic circulation of an extensive High with a secondary center along the north coast of Eastern Siberia. The temperature dropped strongly along the northern and northwestern coast of Alaska (Barter Island, Barrow, Wainwright, Kotzebue, Nome). The same kind of circulation generally continued on January 10 (Figure 18) and temperatures dropped everywhere.

The cold arctic air pushed southward along the west coast and reached the southwestern coastal region. So, for instance, at Bethel the mean temperature dropped by 27°F from the 9th to the 10th of January.

On January 11th a weak trough stretched from SSE to NNW, covering Alaska. This baric situation supplied cold arctic air to the west part of Alaska from northwest and cold continental Canadian air to the east part of the country from the east. Very weak pressure gradient dominated Alaska. The temperatures continued to drop, especially in the interior of the country: at Fort Yukon by 8°F, at Tanana by 38°F, at Fairbanks by 26°F, at Eielson Field by 24°F, at Lake Minchumina by 30°F, at McKinley Park by 14°F, at McGrath by 32°F, at Bethel by 24°F.

During January 12th and 13th a weak ridge from southwest built up over Alaska which furthered the supply of cold arctic air from west and Canadian air from east (Figure 19, weather map for January 12, 1960). The temperatures continued to fall and reached in the interior regions the lowest values for this month. On January 13th, Fort Yukon had a mean temperature of -53.5°F, Tanana -54.5°F, Fairbanks -47.0°F, Eielson Field -44.5°F, McGrath -48.5°F, Bethel -27.5°F.

On January 14th a local high pressure center was formed over Alaska. Cloudless sky furthered the radiation. Some stations along the northern shore and in the interior regions showed the lowest mean daily temperatures for this month: Barter Island -41.5°F, Barrow -41.0°F, Lake Minchumina -46.5°F, McKinley Park -27.5°F, Talkeetna -28.5°F. Other stations mostly sustained their mean daily temperatures from the previous day.

On January 15th, the synoptic situation remained almost the same; also the mean daily temperatures did not change much. On January 16th, the local high

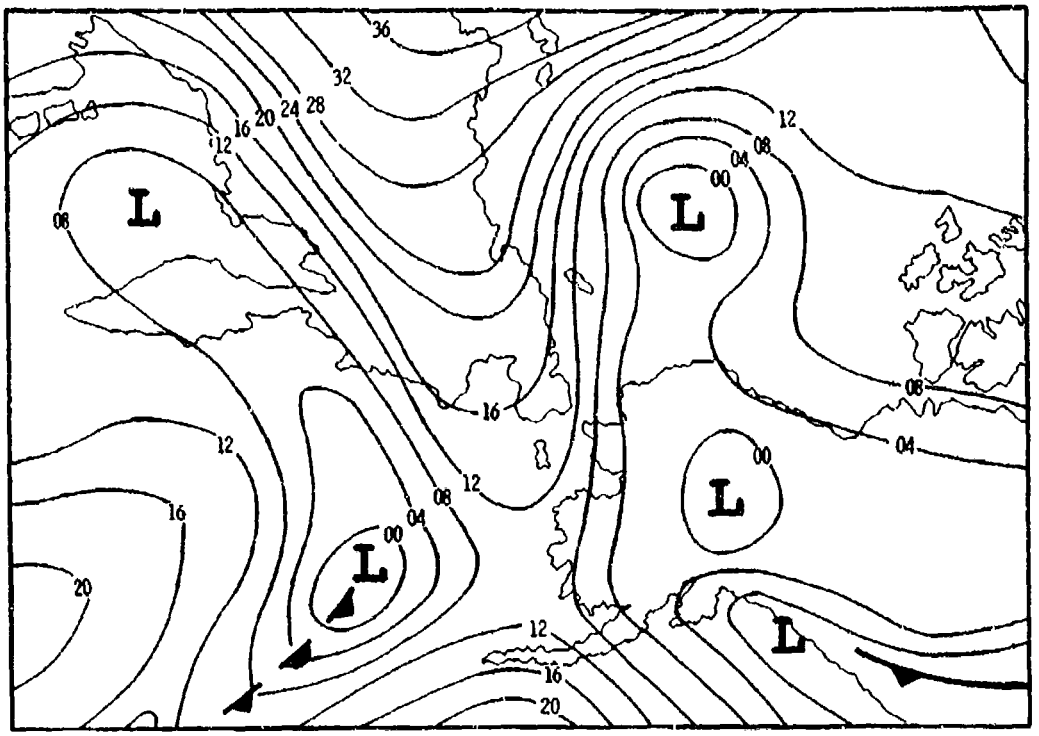

FIGURE 18. 11 JANUARY 1960 (0000Z)

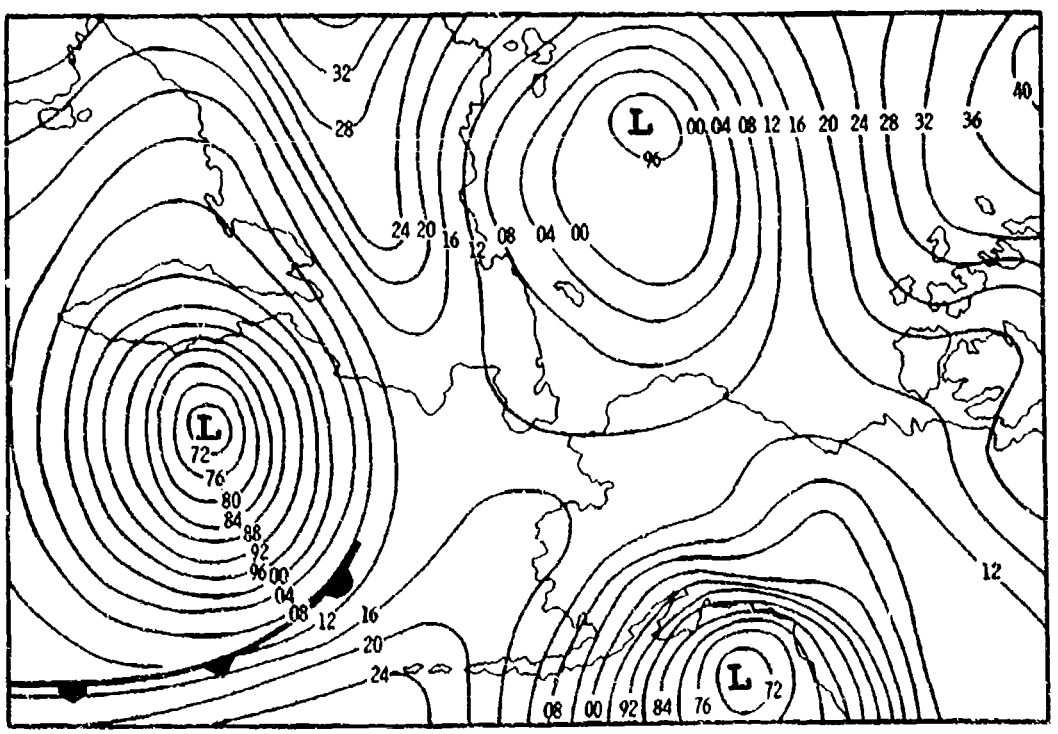

FIGURE 19. 13 JANUARY 1960 (0000Z)

pressure system moved eastward; therefore, the southerly flow dominated the southern regions, where the temperature rose. The northern part of Alaska, including Kotzebue and Fort Yukon, sustained their temperatures.

During January 17 - 22, Alaska was influenced mostly by an extensive Low, centered southwest from Alaska, which brought to the country warm Pacific air. Only on January 19th, and 20th a ridge from the Siberian High covered a part of Alaska; however, the influence of this ridge was mostly limited to the northern coastal region.

After January 22nd a ridge stretching from northwest influenced the northern part of Alaska. This influence became stronger when the center of the High moved eastward. The inflow of the cold Arctic air, combined with radiation effect caused a strong drop of temperature in the central eastern regions during January 27th - 29th, (Fort Yukon, Tanana, Fairbanks, Eagle, Eielson Field).

Also during January 23rd - 31st, the northern coastal region was affected by the cold arctic air, and therefore the temperature remained subnormal up to the end of the month.

Temperature Regime

All over Alaska the cold period in January 1960 lasted from about the 9th to the 16th day. The lowest mean daily temperatures were recorded during this period. Only the interior regions in the upper reaches of the Yukon River had the lowest mean daily values observed at the end of the month, (Eagle -35.5°F on January 28th).

The variations of mean daily temperatures during this very cold January, are presented graphically in Figure 20 for the station at Barrow, which had subnormal daily temperatures almost during the whole month. The curve shows the coldest mean daily temperature on January 14th. On this day the synoptic chart showed a local high pressure center over the middle regions of Alaska. This center was formed within a pressure ridge that extended over the Canadian Archipelago from NE.

This synoptic situation lingered for two or three days and was changed on January 18th, when a warm trough extended from the Aleutian Low covering practically all of Alaska. It formed two small local centers of low pressure; one over the western part and the other over the NE area of Alaska.

At that time, the graph for the station at Barrow showed a peak in the curves of the mean daily temperature line. This peak separated the very cold spell of a NE origin from the second cold spell, which occurred during the 19th - 23rd of January and was originated by the extension of a ridge of the North Siberian High from the west.

Comparing the temperatures of these two cold spells, it can be seen that the influence of the NE action, the inflow of the cold air masses from the High over the Canadian Archipelago, has produced considerably lower temperatures than those effected by the North Siberian High with a westerly flow of cold

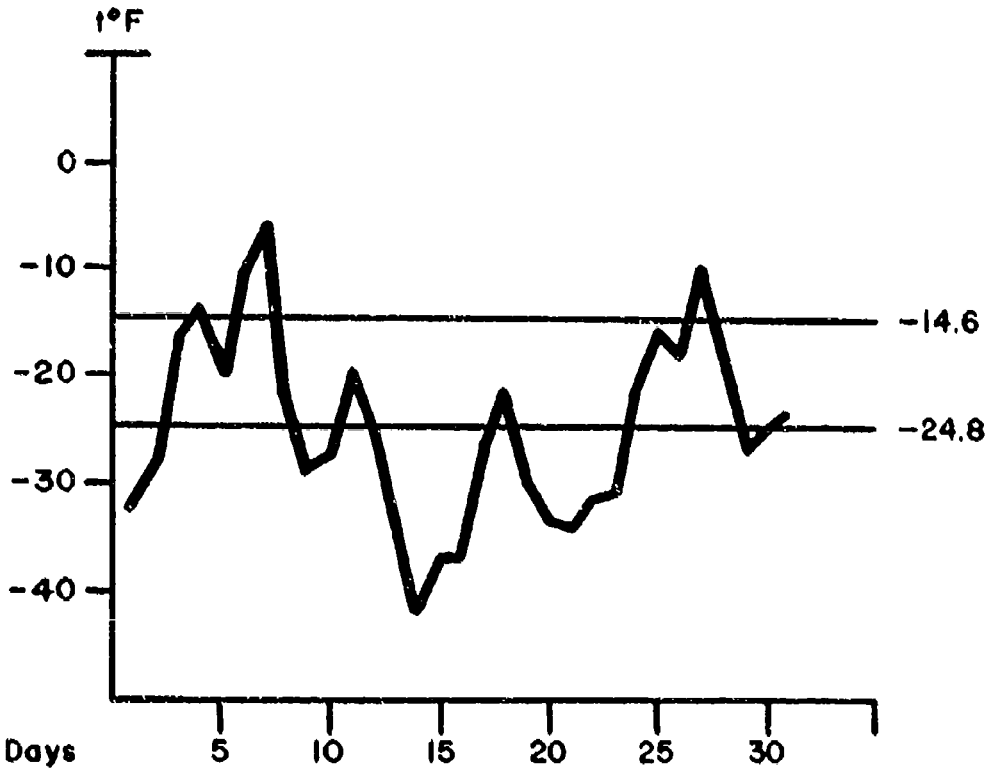

Figure 20. Mean daily temperatures for January 1960 at Barrow.

continental air. When the Siberian High stretches out a ridge toward Alaska, it covers usually only the northern regions at the Arctic coast, producing a cold spell in the north coast regions while the other areas may not feel the cooling effect at all.

The distribution of mean monthly temperatures in January 1960 is shown on Figure 21. It is easy to see that the very cold regime was observed only in the Northern Drainage Area, while the southern half of Alaska had normal or above normal temperatures.

While Barter Island was about 12°F below the normal monthly value (as derived from 1948-1964) and Barrow about 10°F below it, the southern section of Alaska, as was mentioned before, had milder temperatures, with many stations recording the mean monthly temperatures above 0°F, which is close to normals or even above them.

The distribution of the lowest temperatures recorded in January 1960 is shown on Figure 22. The northeastern and central regions were the coldest, with minimum temperatures of -50°F and -60°F, while the southern coastal zone had the minima of -20°F and higher.

Figure 23 shows the distribution of the departures of mean monthly temperatures observed in January 1960 from the mean values derived from observations during 1948-1964.

Upper Air Temperatures

Examining the thermal structure of the atmosphere over Barrow and comparing the vertical profile of temperature for the coldest and the warmest day in January 1960, from the graph on Figure 24, one can see the following features:

1. The height of the surface inversion is a little greater on the warmest day, January 7th, than on the coldest day of January 14th.

2. On both days the atmosphere was warmer than the surface in the layer about 4 km high, at which height approximately, the temperature reaches the same value as was observed at the surface.

3. The largest difference in temperatures between the warmest and the coldest day was observed at the height of 3 km, consisting of about 15°C. Higher up, the difference diminished and at the height of about 8 km the temperature was almost equal on both days (-50°C.)

4. The height of the tropopause was lower on the coldest day (6 km), as compared with the warmest day (8 km).

5. The lapse rates in the troposphere computed as average values for the layers between 4 km and the tropopause level showed somewhat smaller values for the coldest day when they were about 0.6°C/100 m, as compared with the warmest day, when they were about 0.7°C/100 m.

6. The stratosphere was colder on the warmest day by about 2-3°C as compared with the coldest day of this month. The inversional lapse rates in the

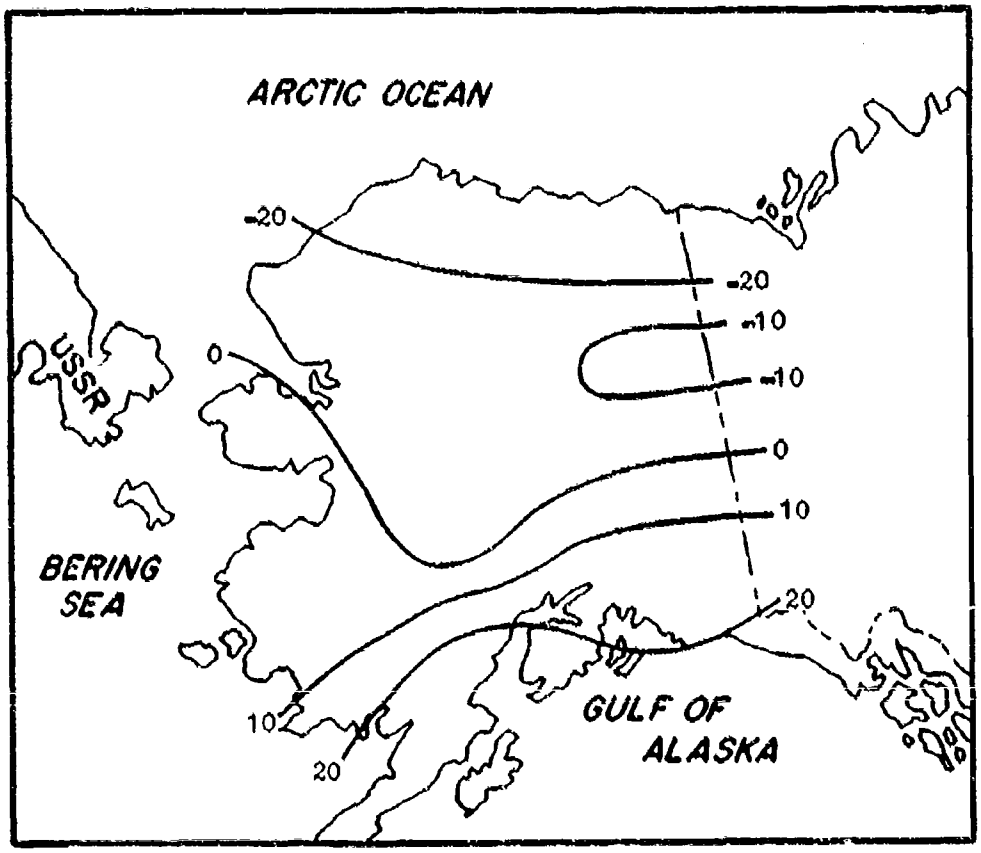

Figure 21. Mean monthly temperatures for January 1960.

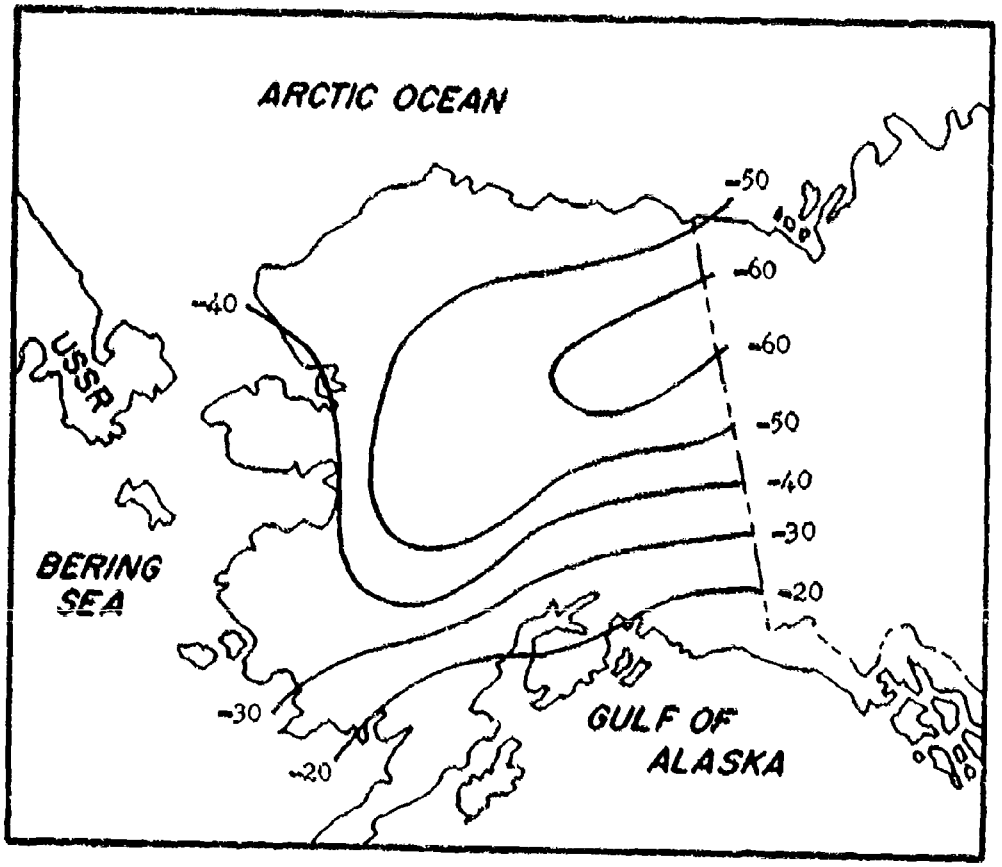

Figure 22. The lowest temperatures observed in January 1960.

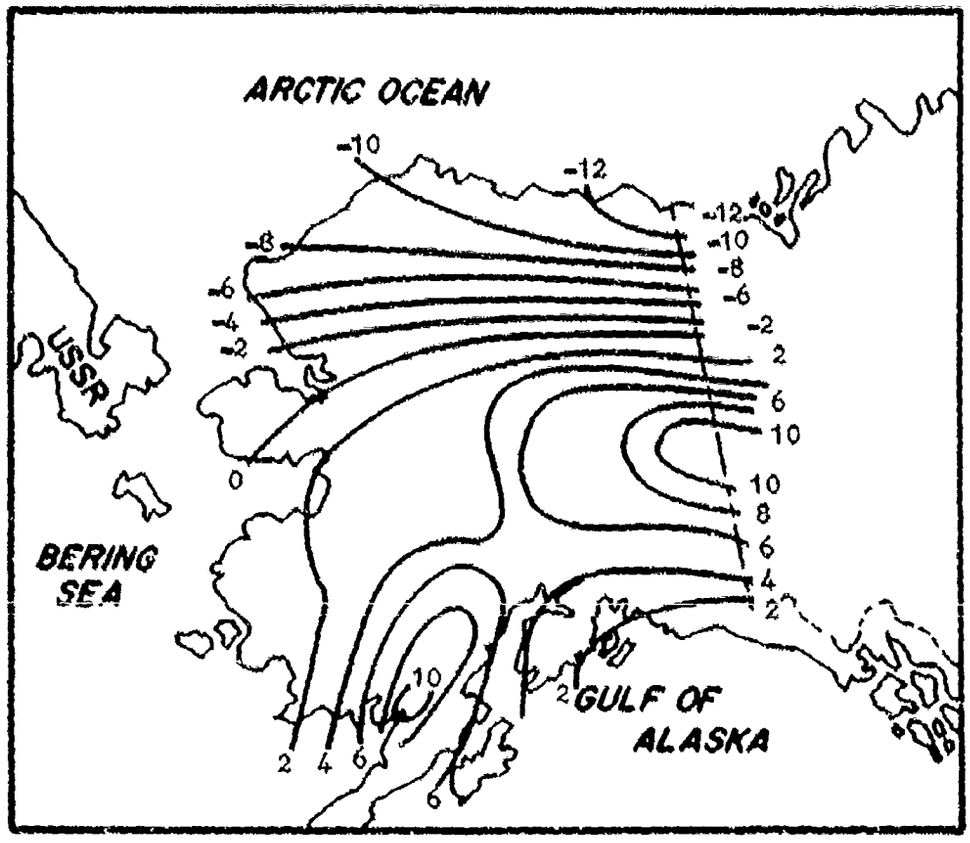

Figure 23. The departures of mean monthly temperatures in January 1960 from the mean values (1948-1964).

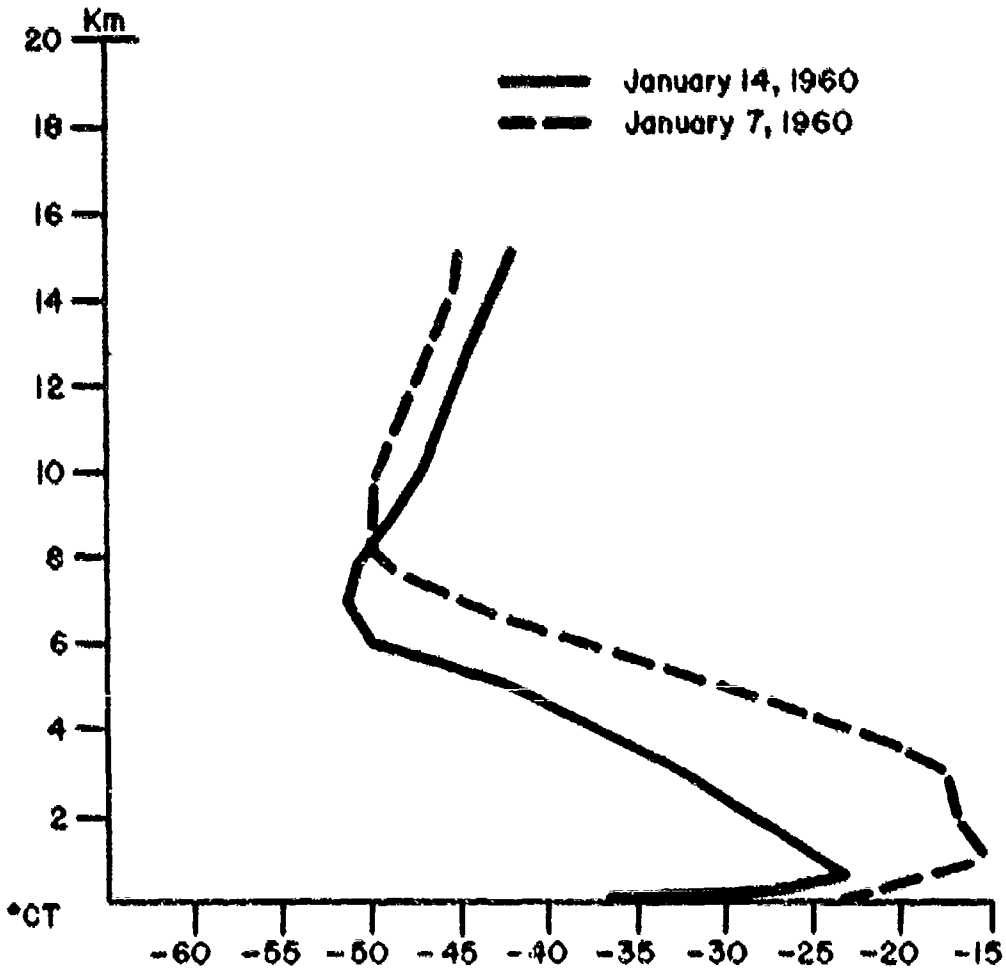

Figure 24. Vertical distribution of temperature at Barrow on the coldest day of January 1960 (14th), and the warmest day - January 7th (0000Z)

stratosphere, as computed for the layer from the tropopause to 15 km level, were on the average about 0.09°C/100 m on the coldest day and about 0.07°C/100 m on the warmest day of January 1960.

FEBRUARY 1950

Atmospheric Circulation

Over the entire Alaskan region the weather was exceptionally cold, dry, and clear during this month. Predominant pressure patterns showed large areas of high pressure over the northern regions of Alaska, over the adjoining section of the Arctic Ocean and over the Canadian Archipelago. At the end of the month, the high pressure area was present over the East Siberian Peninsula as well. The Low over the Gulf of Alaska was rather weak most of the time and did not affect the northern part of Alaska during the month; its influence was felt only in the southern sections.

The first half of the month, in which the lowest mean daily temperatures for this month were observed at the stations of the southern regions of Alaska (Lake Minchumina, Talkeetna, Valdez, Bethel, Iliamna, Yakutat and Kodiak) was also unusually windy in this area. The winds exceeded 25 mph on many days of the first half of the month. The wind blew consistently from a northerly direction at Bethel, and this station reported a record average hourly velocity of 15 mph. The highest mean hourly wind speed was also observed at Kotzebue, establishing a record for this station of 16.8 mph.

In the northern regions the lowest mean daily temperatures appeared later, mostly between the 11th and the 13th day of February.

The temperatures started to drop generally on the 2nd of the month in the northern and central parts of the country.

On February 2nd, a High centered over the Bering Sea started to influence the country. The inflow of cold arctic air caused the drop of temperatures everywhere except the south coast: even at Bethel and King Salmon the mean daily temperature dropped by 22°F and 18°F, respectively. During the next day, February 3rd, the high pressure system spread out over Alaska and only the south coast was affected by the Low centered off the shore southeast of Alaska. The temperatures decreased more, especially in the northern part and in the interior regions.

On February 4th, a low pressure center moved from west to the northwest shore of Alaska and influenced during February 4th and 5th, the northwestern regions where temperatures rose due to the inflow of southwestern Pacific air in northwestern and western sections of Alaska. (Barrow, Wainwright, Kotzebue, Nome, and Bethel).

On the north coast (Barter Island) and in the interior regions the temperatures continued to drop.

Early in the morning of February 6th, a high pressure system centered over the Chukchi Peninsula started to influence the northern and central regions

(Figure 25, for the 6th of February). The temperatures generally dropped also at Nome and Bethel, which were directly subjected to the inflow of Arctic air from the northwest. During the next days the high pressure system spread out over the northern part of Alaska, influencing also the central part. The supply of cold arctic air and the effect of radiation caused a further decrease of temperatures.

During February 11th, the center of the high pressure system moved a little eastward and the winds veered to more easterly directions, (Figure 26, Weather situation on February 11th, in the afternoon).

The mean daily temperatures at the north coast reached their minimum for this month: Barter Island -55.0°F, Barrow -46.5°F and Wainwright -41.0°F. In the period of February 11 - 15, the high pressure system consolidated again over the northern part of Alaska. The temperature rose a little along the northern coast; however, it remained generally low. At Kotzebue, Nome and King Salmon, the temperatures reached their minimum for this month.

On February 16th, the center of the high pressure system receded eastward, and a disturbance centered east of Kamchatka started to influence the west and northwest coast (Figure 27, Weather Situation on February 17th, 003CZ). This situation continued for 3 days during which time the temperature rose at stations: Barrow, Wainwright, Kotzebue, Nome and Bethel. Less affected were the east part of the northcoast and the interior regions. Eagle showed even a decrease in temperature.

On February 19th, the rear of a low, centered off the northwest coast, started to influence the northwest and the west coast of Alaska. The temperatures dropped again - at Barrow, Wainwright, Kotzebue, and Nome. Later the inflow of cold arctic air was strengthened by a strong ridge from the west (Figure 28, Weather Situation on February 21st, in the afternoon).

Until the end of the month, the northern part of Alaska was generally dominated by a High, centered north off the coast (NW, N, NE), while the southern part was influenced by an extensive Low centered generally south from Alaska. The temperatures remained low in the northern regions.

Temperature Regime

In February 1950, the station on Barter Island showed the lowest mean monthly temperature in Alaska, and it was the lowest mean recorded for February at this station for the period 1948 - 1964.

The graph of mean daily temperatures for Barter Island (Figure 29) for February 1950 shows a large magnitude in the range of daily temperatures: on February 1st, the mean daily temperature was 6.5°F, while on the 11th day it dropped to -55.0°F, a difference of more than 60°F between these extreme days. There were only three days in this month when the temperature was above -20°F, which is about the normal mean monthly for February; on all the other days the temperature was, mostly much below normal. The mean value for February in this year was 23.6°F below the long period average.

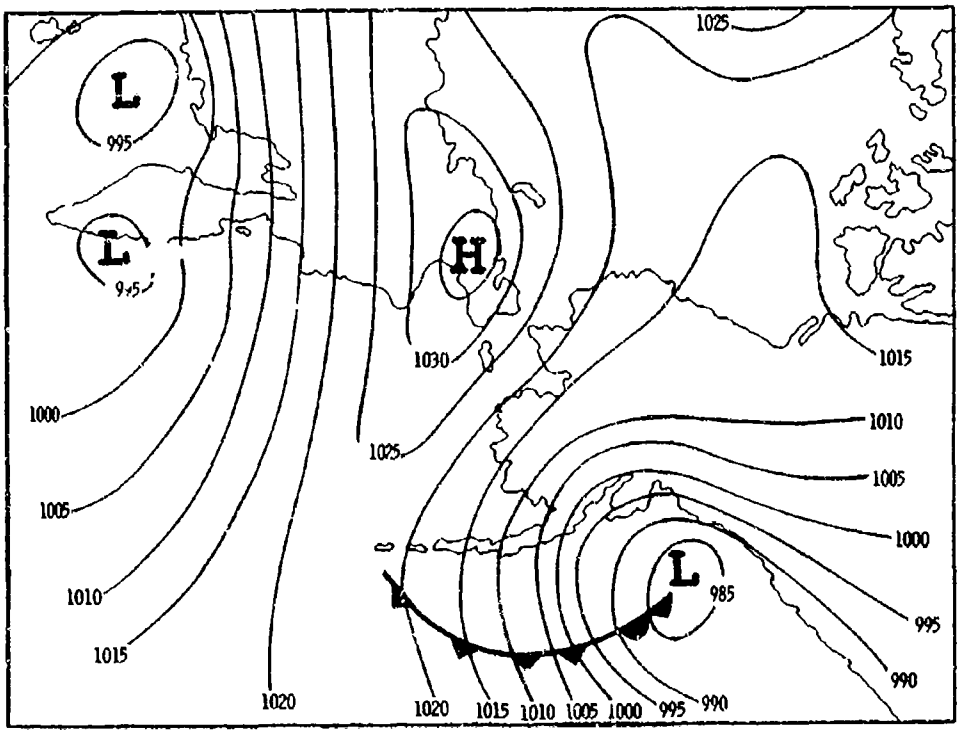

FIGURE 25. 6 FEBRUARY 1950 (1200Z)

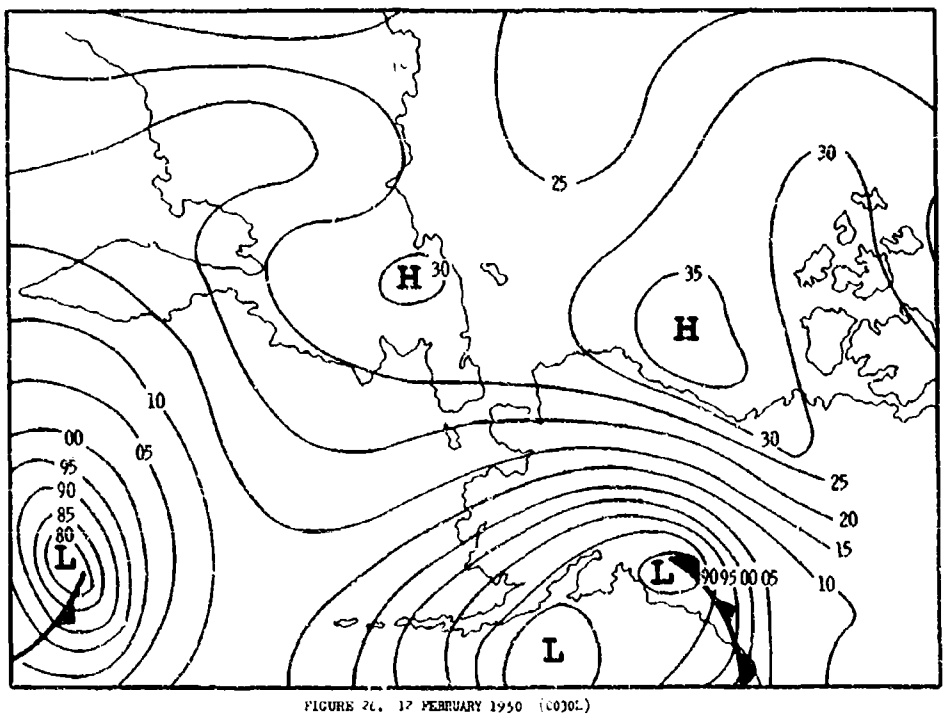

FIGURE 26. 17 FEBRUARY 1950 (0030Z)

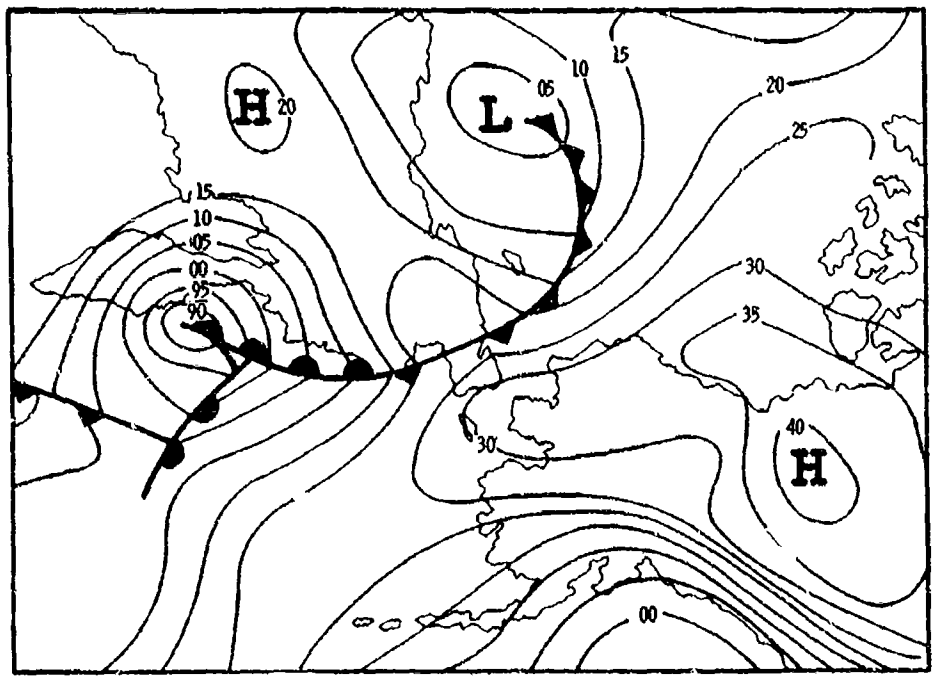

FIGURE 27. 17 FEBRUARY 1950 (00302)

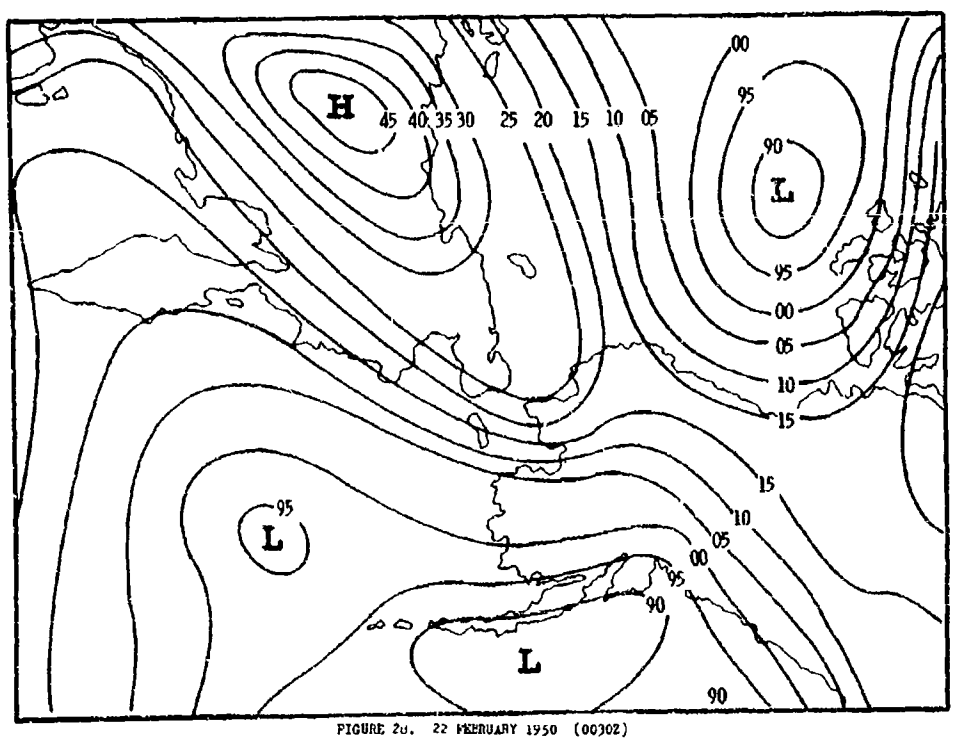

FIGURE 28. 22 FEBRUARY 1950 (00302)

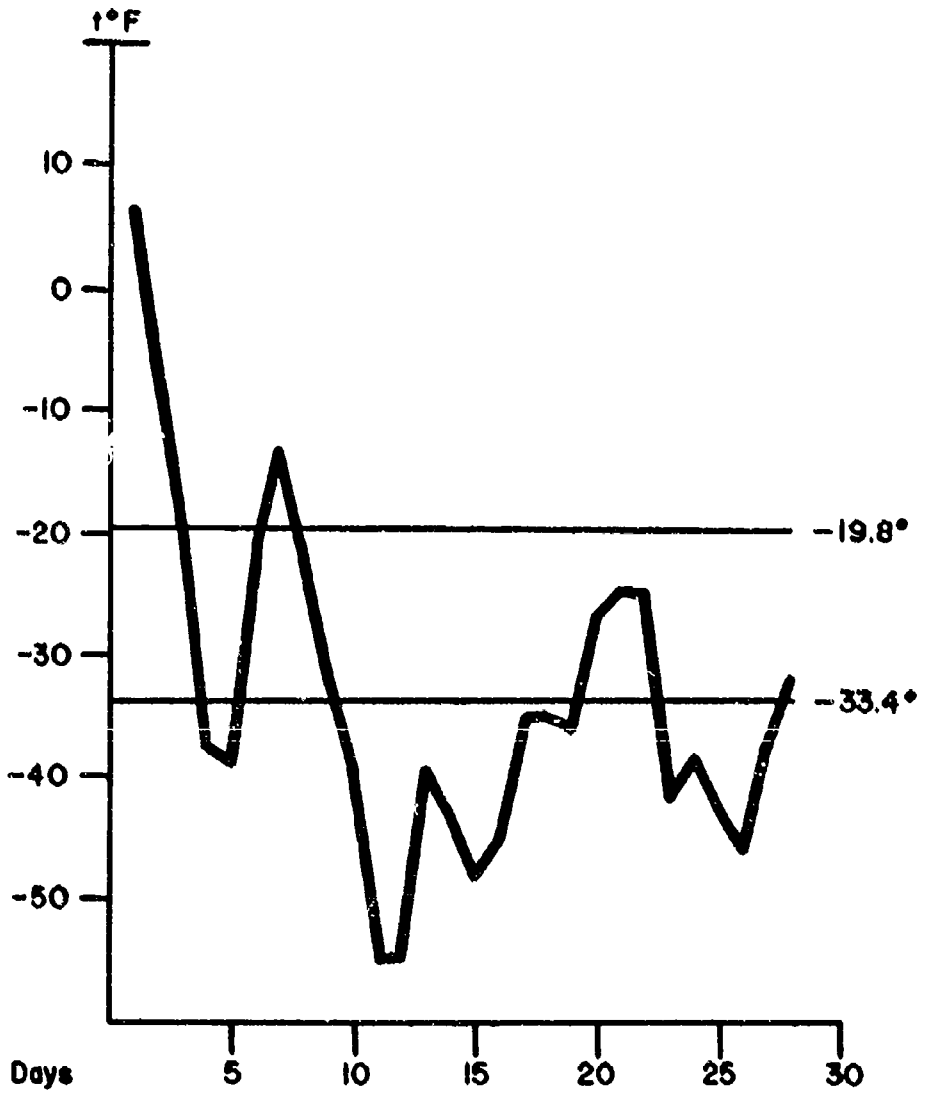

Figure 29. Mean daily temperatures in February 1950, Barter Island

The distribution of the mean monthly temperatures in February 1950, over Alaska is shown on Figure 30. It can be seen that in the northern half of Alaska, the mean gradient of temperature is directed from west to east, while in the southern half the gradient has a north to south direction. The coldest temperatures of -30°F and lower, were observed in the northeastern section, while the Gulf of Alaska region had the warmest temperatures.

Comparing the distribution of the mean temperatures of February 1950 with the normal means for this month computed from the period 1930 - 1960 (Figure 31), it can be seen that the resemblance between the patterns of temperature distribution is rather good and the difference is mainly in the quantitative characteristics. Roughly speaking, February 1950 was about 10°F colder than the normal values, almost in all regions of Alaska.

The distribution of the lowest temperatures observed during February 1950 is shown on Figure 32. The pattern of distribution of these absolute minima is similar to that for the mean temperatures: the lowest values are observed in the northeastern sections, the highest - in the southern regions.

February 1950 had large negative anomalies of mean temperatures over the entire Alaska region. Somewhat smaller negative departures were observed over the coastal zone. The largest departures of the mean temperatures reached -20°F in the eastern mountainous regions, which, however, could be partly due to the local terrain. (Figure 33).

Upper Air Temperatures

Ascents were plotted for the warmest and the coldest day of February 1950. For comparison, the mean upper air conditions for this month were presented, also, all for the station at Barrow (Figure 34).

The warmest day, February 1st, showed temperatures remarkably higher throughout the whole troposphere in comparison with the average conditions for this month. Only the lower stratosphere had temperatures 5 to 6°C warmer than the average conditions. In comparison to the mean temperature for this particular month, the temperatures on February 1st were about 10°C higher in the lower troposphere; only at 8 km the difference in temperature decreased to 5°C and starting with 9.3 km height and up, the differences in temperature reversed, being colder than the average.

The ascent for February 1st, shows an almost isothermal layer from the surface to approximately 2 km height, with a temperature of about -10°C. From 2 km to the tropopause (10 km), the temperature lapse rate was very constant with a value of 0.66°/100 m.

The coldest day of this month, according to the records of surface temperatures, February 11th, showed a pronounced surface inversion up to 1.4 km. From this height up to 5.1 km the air was quite stable. Above 5.1 km up to 8.6 km the temperature lapse rate was uniform with the value 0.67°/100 m. The height of the tropopause was 8.6 km - the same as under average conditions for this particular month. The temperature of the base of the tropopause was -55°C.

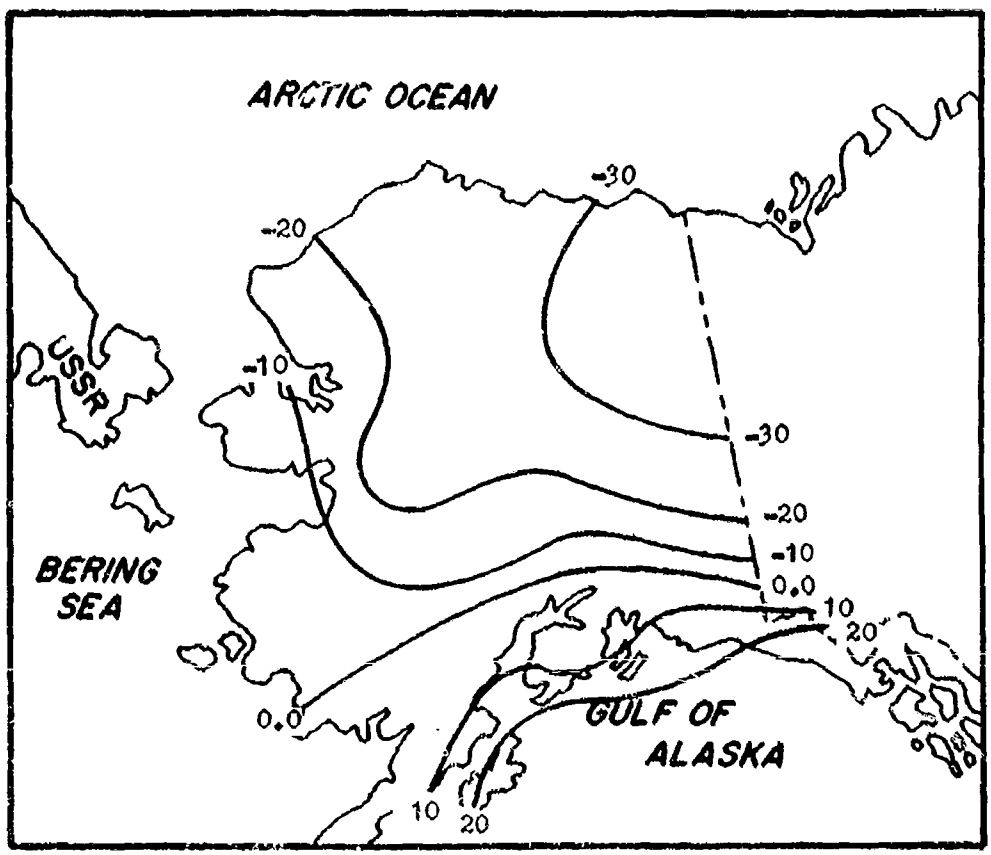

Figure 30. The distribution of the mean monthly temperatures in February 1950.

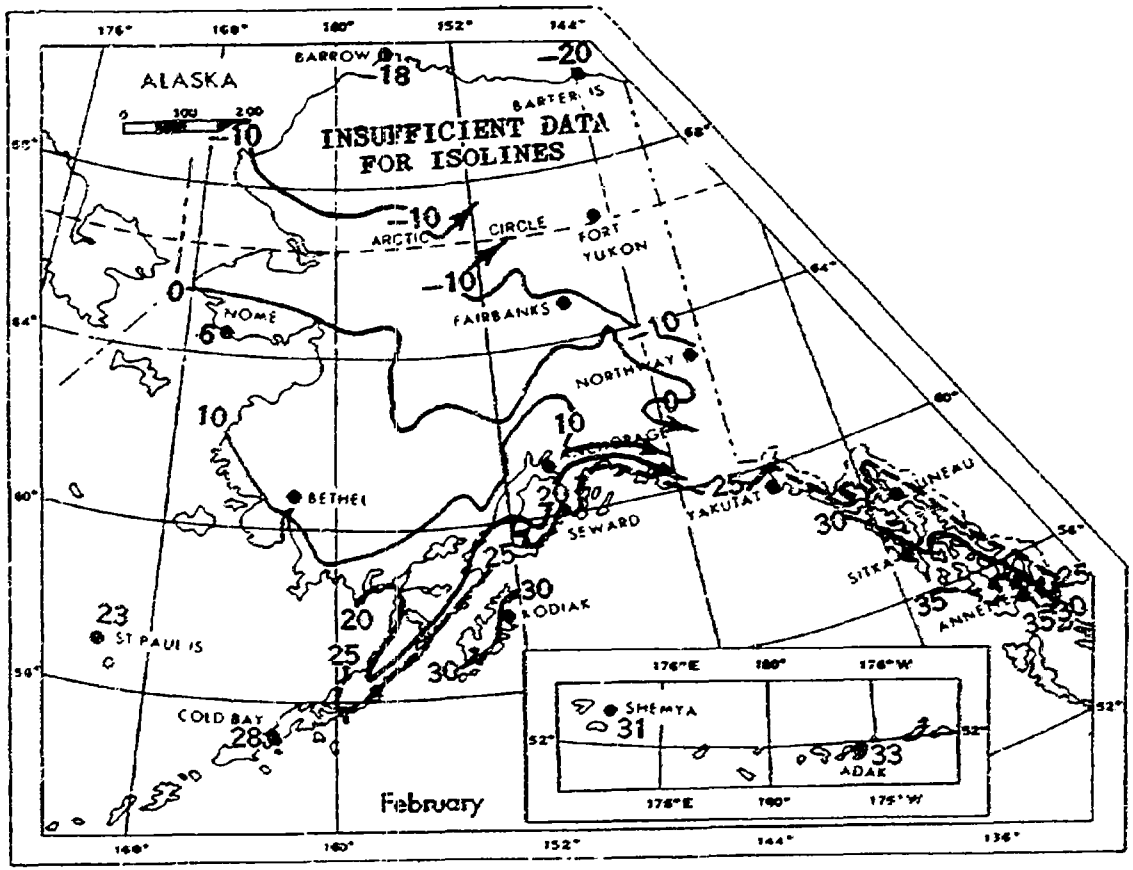

Figure 31. Normal mean monthly temperatures for February (1931-1960).

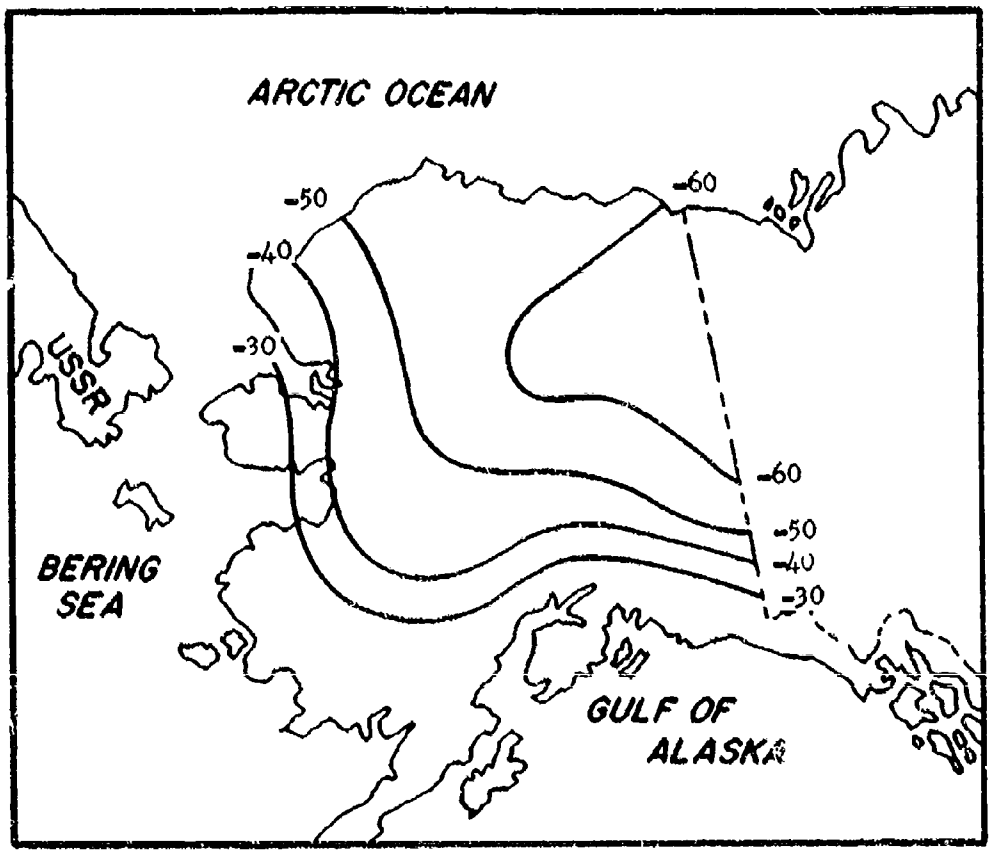

Figure 32. Lowest temperatures for February 1950.

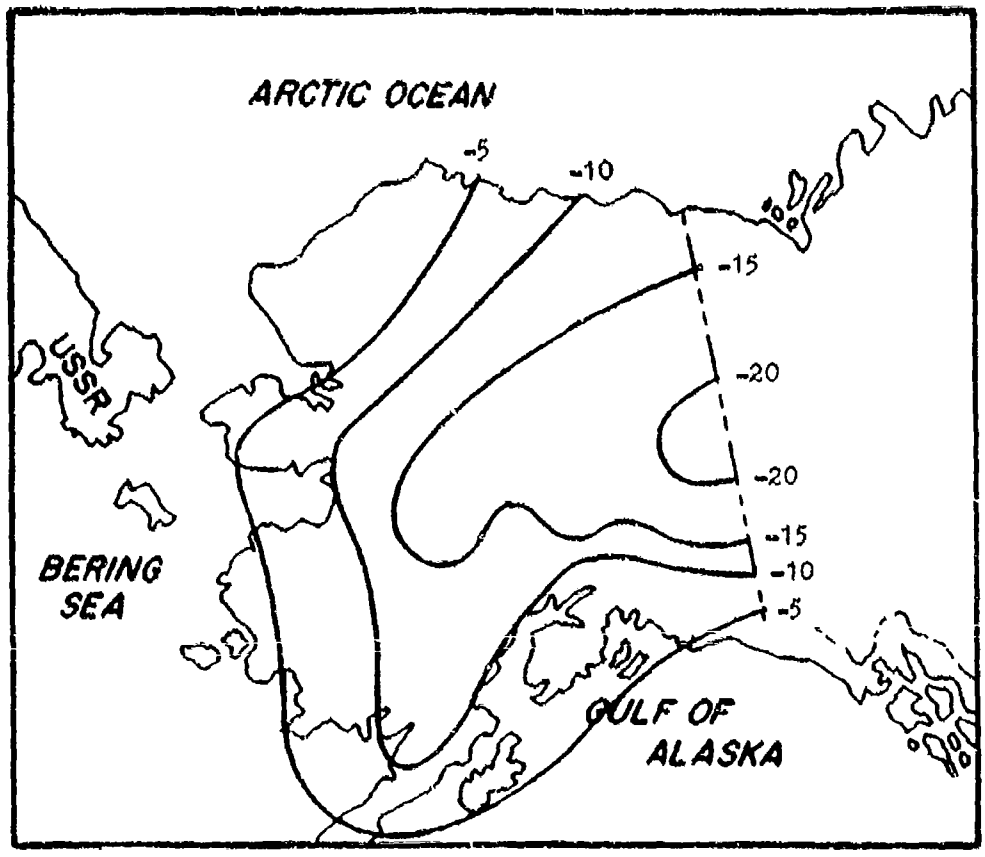

Figure 33. Departures of mean temperatures for February 1950 from the values derived for the period 1948-1964.

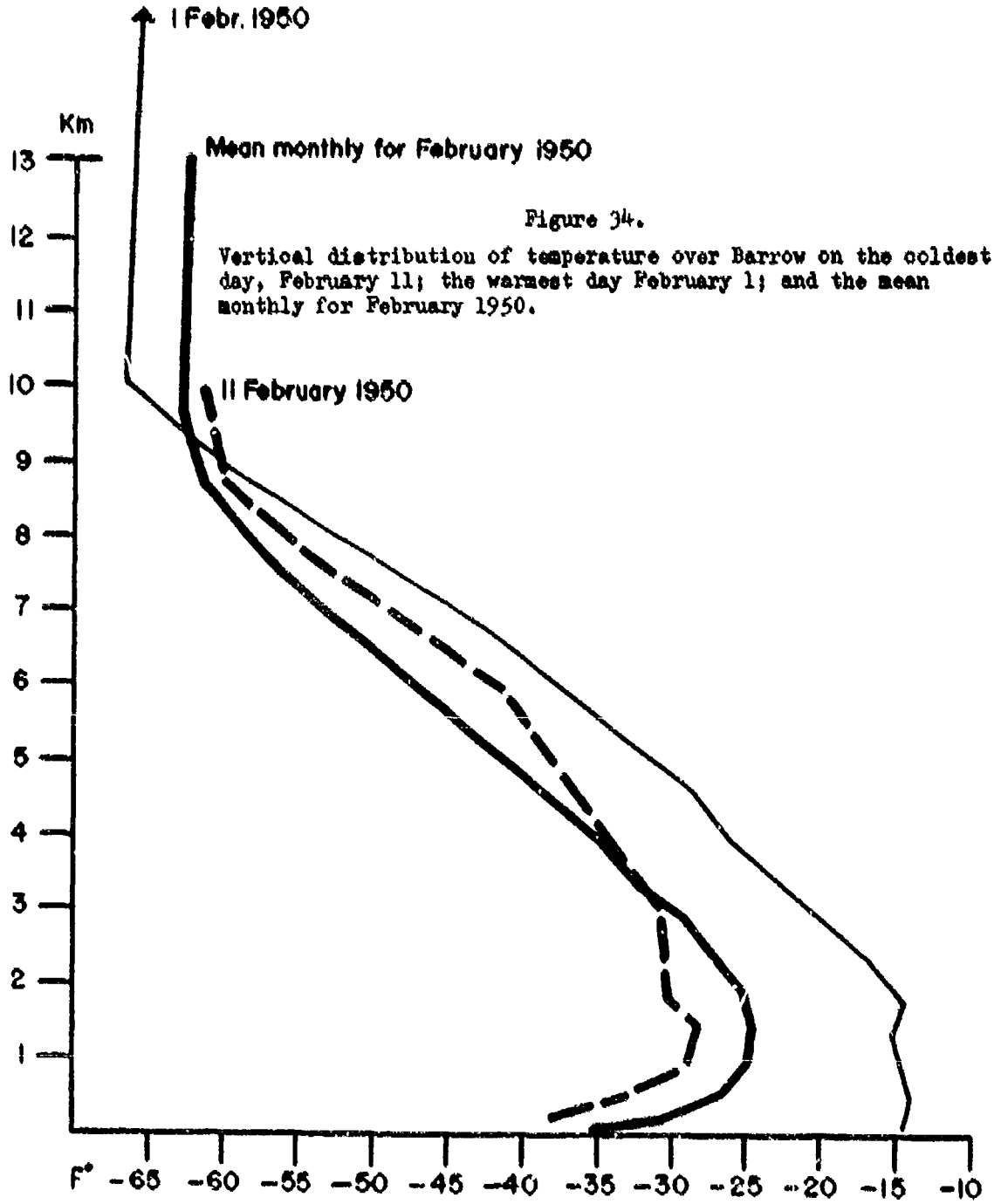

Figure 34.

Vertical distribution of temperature over Barrow on the coldest day, February 11; the warmest day February 1; and the mean monthly for February 1950.

It is interesting to note that on February 11th the air was colder than under average conditions only up to 3.2 km; above this level the air was warmer in comparison with the mean values: the maximum temperature difference in the layer between the surface and 3.2 km was about 4°C; above this level the air on February 11th, was up to 5°C warmer (at 5.0 to 6.5 km) than the air under average conditions.

CONCLUSIONS

The analysis of data for three exceptionally cold winter months permits making the following general conclusions:

1. The coldest temperatures of the northern region of Alaska occur, usually, under the influence of the high pressure center located over the Arctic Archipelago.

2. The high over the Arctic Archipelago affects the northern regions of Alaska by producing an inflow of very cold air from NE, and sometimes forming a local high pressure center over the Alaskan mainland.

3. The synoptic situations which produced the coldest mean daily temperatures on the northern coastal regions of Alaska in all three winter months that were analyzed (December 1957, January 1960, and February 1950) were similar; they showed the influx of cold air predominantly from NE.

4. The very cold periods with mean daily temperatures below -30°F can last up to 16 days in a row, as was observed in December 1957 at Barter Island in the northern region. In the interior of Alaska, at Fort Yukon, the period with mean daily temperatures below -30°F lasted even longer, up to 18 days, in February 1950.

5. Concerning the correlation of the cold spells between various regions of Alaska, it has been found that they may or may not coincide in time between the northern and southern regions.

   In the cold December 1957, when the cold spell was experienced by the northern regions, it was also felt by the western part of the south coast, with departures of temperature of exactly the same order, -7°F, -9°F. The eastern part of the south coast, however, was not affected by the severe cold spell and had temperatures close to normal conditions. (Figure 15).

   The cold January 1960 showed a different picture. In this month the northern half of Alaska experienced a very cold spell, with monthly temperature departures up to -10°F, -12°F, while the southern part of it, in a sharp contrast,

experienced an unusual warming, especially so in the western part of the south coastal region, where the departures of monthly temperatures were positive, reaching up to +8°F, +10°F. Positive departures of the same order were also observed in the interior regions, in the upper reaches of Yukon and Tanana rivers.

In the cold February 1950, the temperature departures from normal were most evenly distributed around the interior region of Alaska, and were almost equal between the northern and southern coasts, fluctuating between -5°F and -10°F. The interior regions had the largest negative departures of -15°F, and -20°F.

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Mean Daily Temperatures (°F) for D e c e m b e r 1957

Days	Barrow	Wainwright	Barter Island	Kotzebue	Port Yukon	Tanana	Fairbanks	Eagle	Galena	Elielson Field	Nome	Lake Minchumina	McKinley Park	Tok	McGrath	Talkeetna	Anchorage	Valdez	Bethel	Illiamna	Yakutat	King Salmon	Kodiak
1	-12.0	-12.0	-14.5	13.5	16.0	4.5	1.5	10.5	11.0	- 3.5	20.5	8.5	21.5	- 7.0	6.0	30.0	30.5	29.0	32.0	36.5	25.5	35.5	37.5
2	-12.5	-13.5	-10.0	20.0	9.0	2.0	4.5	11.5	6.0	1.0	25.5	7.5	20.0	- 4.0	- 1.0	23.0	32.0	33.0	30.0	34.5	38.0	32.0	36.5
3	-10 5	-11.0	- 8.5	24.0	-13.0	6.5	0.5	- 2.5	4.0	- 3.0	24.0	5.0	8.5	- 6.0	1.5	22.0	28.5	29.0	23.5	23.0	33.5	27.5	33.5
4	-13.0	-10.5	-13.0	6.0	-13 0	- 1.5	- 2.5	- 5.5	0.5	- 7.0	17.0	- 3.0	12.0	- 7.5	1.0	22.0	23.5	24.0	23.0	29.0	33.5	28.5	36.0
5	-20.5	-16.0	-14.5	- 3.5	-18 .	- 4.0	- 3.0	11.0	-10.0	- 2.0	15.5	- 6.0	21.0	- 7.5	- 4.0	25.5	22.5	28.5	12.5	28.0	33.0	21.5	35.0
6	-22.5	-22.0	-17.0	- 9.0	-22.5	- 4.0	1.5	14.0	- 5.0	- 1.0	1.5	-10.5	21.0	- 8.0	- 3.5	19.5	23.5	30.0	8.5	18.0	33.0	15.5	31.5
7	-16.5	-21.5	-22.0	- 1.5	-23.5	- 5.0	- 5.0	13.5	4.5	- 4.5	1.0	- 4.0	12.5	-15.0	- 2.5	17.5	28.0	27.0	7.5	15.0	34.0	7.0	30.5
8	- 9.0	- 9.0	-16.0	0.5	- 7.0	- 1.5	-11.5	- 1.0	- 1.0	-10.0	12.0	- 6.0	1.0	-14.0	- 9.0	5.0	13.0	24.5	23.0	18.0	33.0	14.5	32.5
9	-12.0	- 9.0	-13.0	11.0	- 2.0	4.5	8.0	0.5	13.5	- 3.0	24.0	3.5	9.0	- 6.5	17.0	20.5	26.5	22.0	28.5	34.0	27.5	28.0	38.0
10	- 5.5	- 3.5	- 1.0	19.5	- 7.0	12.0	15.0	14.0	18.0	14.5	21.5	10.5	23.0	2.0	25.0	23.0	30.5	22.0	20.5	21.0	35.0	21.0	35.5
11	1.5	1.5	6.5	16.0	3.0	7.0	11.5	7.5	12.5	4.0	19.0	11.5	9.5	2.0	14.5	11.5	21.0	22.0	28.0	20.0	36.0	25.0	33.0
12	- 2.5	0.5	- 1.5	7.5	1.0	9.5	8.0	0	13.0	1.0	23.0	8.0	8.0	- 6.5	12.5	14.0	17.5	26.0	27.0	28.5	35.0	28.0	35.0
13	- 8.5	- 6.0	1.5	11.0	-15.5	11.5	10.0	- 0.5	12.5	6.5	13.0	11.5	11.0	0	16.5	5.5	21.5	26.5	27.0	23.5	34.5	21.5	36.5
14	-17.0	-10.0	- 8.5	5.5	-17.5	6.0	4.0	- 7.0	1.5	5.5	3.5	11.0	12.5	1.5	0	- 4.5	12.5	29.5	9.5	17.0	32.0	12.5	33.5
15	-22.5	-18.5	-22.0	7.5	-23.5	- 9.5	-11.5	- 4.0	- 0.5	- 6	7.0	- 0.5	- 1.0	- 2.0	-12.5	- 6.0	3.0	24.5	- 1.5	3.5	29.0	4.0	25.5
16	-19.0	-22.0	-33.5	- 8.5	-23.5	-25.0	-23.0	-15.5	- 1.0	-25.0	1.5	-15.5	-14.0	-15.0	-17.0	- 8.0	- 4.0	22.0	- 8.5	- 3.5	23.5	- 7.0	24.5
17	-21.0	-21.5	-35.0	-25.5	-25.5	-29.5	-30.5	-32.5	-18.0	-31.0	- 7.5	-28.0	-24.0	-20.5	-30.5	- 8.5	- 5.0	16.5	- 9.0	- 4.0	24.5	- 8.5	24.5
18	-23.5	-22.5	-31.5	-28.0	-31.0	-33.5	-32.5	-31.0	-38.0	-33.0	-15.5	-25.5	-30.0	-32.5	-38.5	-12.5	- 4.5	11.5	-17.0	- 6.0	23.5	- 5.5	26.5
19	-26.0	-24.5	-30.5	-30.5	-39.0	-36.5	-33.0	-35.0	-39.0	-34.5	-13.5	-39.0	-34.0	-44.0	-46.0	-21.0	-11.0	4.0	-25.5	-12.5	23.5	-17.0	19.5
20	-21.5	-25.5	-37.5	-33.5	-36.5	-39.0	-35.5	-32.5	-45.0	-33.0	-21.5	-43.5	-32.0	-36.0	-49.5	-13.5	-12.0	2.0	-30.0	-20.0	25.5	-23.5	10.5
21	-22.5	-25.5	-36.0	-29.5	-36.5	-33.5	-33.5	-31.5	-37.0	-35.5	-24.5	-36.0	-31.0	-35.5	-31.5	-11.5	- 0.5	7.0	-36.5	-20.5	26.0	-25.5	11.5
22	-26.5	-28.0	-35.5	-29.5	-41.5	-25.0	-36.0	-33.0	-35.0	-37.5	-18.5	-28.5	-29.5	-47.0	-29.0	- 2.5	- 1.0	4.5	-27.5	-16.0	18.0	-21.0	15.5
23	-30.5	-31.0	-31.5	-35.5	-35.0	-37.0	-33.0	-32.5	-42.5	-30.0	-23.5	-23.0	-26.5	-35.5	-39.0	- 8.5	- 6.0	5.5	-29.5	-20.0	19.5	-21.0	21.0
24	-34.0	-30.0	-30.0	-38.0	-35.0	-36.0	-36.0	-22.5	-47.0	-35.5	-19.0	-24.5	-29.0	-43.0	-44.5	-11.5	- 9.5	4.0	-31.0	-18.5	26.0	-23.5	22.5
25	-39.0	-21.0	-37.0	-33.0	-32.5	-45.0	-38.5	-23.5	-49.0	-34.5	-21.5	-28.5	-34.5	-44.0	-48.0	-23.0	-13.5	- 1.5	-30.5	-21.5	18.5	-22.5	12.0
26	-40.5	-34.5	-39.5	-41.0	-35.5	-40.5	-37.0	-23.5	-41.0	-36.0	-31.5	-33.0	-36.5	-28.0	-33.0	- 7.5	- 6.5	4.0	-36.5	-23.0	21.0	-20.5	10.0
27	-36.5	-41.0	-37.0	-35.5	-22.0	-28.0	-31.0	-24.0	-37.5	-30.0	-32.5	-20.5	-28.5	-18.0	-18.5	4.0	5.0	13.0	-29.0	-13.5	28.5	-10.0	12.5
28	-30.5	-39.0	-34.5	-31.0	-25.5	-31.5	-30.0	-22.0	-42.0	-27.0	-32.0	-19.5	-21.0	-12.0	-25.0	- 6.5	- 1.0	9.0	-35.0	-14.5	17.5	-18.0	14.0
29	-30.0	-32.5	-33.0	-41.0	-42.0	-43.0	-35.0	-34.5	-46.0	-32.5	-29.0	-25.5	-29.5	-27.0	-33.0	- 3.0	- 0.5	5.0	-26.0	-13.0	17.5	-15.5	19.5
30	-31.5	-31.5	-34.5	-32.5	-41.0	-46.5	-27.5	-29.5	-42.5	-24.5	-28.5	-26.5	-27.0	-20.5	-28.0	20.0	14.5	17.5	-22.0	-11.0	34.5	-15.5	26.5
31	-36.5	-38.0	-43.5	-40.5	-22.5	-35.5	-20.0	-23.0	-38.0	-23.0	-23 0	-18.5	-25.0	-21.5	-22.5	10.5	10.0	19.0	-20.5	- 7.5	33.5	-13.0	18.0

Mean Monthly Temperatures for D e c e m b e r (°F)

		1946	1947	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	Mean	No. of Years
1.	Barrow	-20.6	-10.0	- 9.9	- 7.6	-10.4	-17.0	-15.6	-17.5	- 9.6	-21.0	- 8.7	-23.3	- 7.9	-16.1	- 8.9	- 4.0	-22.6	-13.6	17
2.	Wainwright	-	-10.2	-10.9	- 8.1	-10.1	-28.0	-15.4	-16.6	- 8.8	-20.3	- 8.6	-22.6	- 8.1	-18.3	- 6.0	- 5.0	-20.3	-13.6	16
3.	Barter Island	-25.6	-14.2	-10.7	- 8.6	- 9.9	-16.4	-15.3	-	-12.7	-23.0	- 6.0	-20.7	- 2.5	-19.2	- 4.6	- 0.5	-23.2	-13.3	16
4.	Kotzebue	- 7.4	- 3.2	0.2	- 4.5	4.0	- 3.1	-17.2	- 2.1	-14.8	-12.6	- 0.2	-14.7	12.0	-14.3	- 2.7	7.1	-12.3	- 5.0	17
5.	Fort Yukon	-	-22.7	- 7.9	-	- 9.0	-16.9	-31.8	-20.2	-36.8	-22.8	-14.8	-15.1	- 5.8	-34.3	-10.8	-	-	-	-
6.	Tanana	-17.8	-12.0	- 7.6	-11.2	- 6.4	- 1.8	-25.5	-12.6	-30.6	-17.0	- 5.8	-11.1	6.4	-26.7	- 8.0	3.8	-28.1	-12.3	17
7.	Fairbanks	-15.6	-10.4	- 5.4	- 7.5	- 3.3	- 4.1	-21.5	- 9.0	-28.2	-15.6	- 7.2	- 9.4	5.4	-23.9	- 6.5	4.0	-26.5	-10.9	17
8.	Eagle	-	-16.3	- 0.3	-11.5	- 3.7	0	-19.7	-20.8	-26.5	-12.3	-11.8	- 7.8	7.0	-24.3	- 4.1	-	-31.0	-12.2	15
9.	Galena	-	-10.7	- 6.1	-11.6	- 3.7	- 2.9	-23.6	- 8.6	-28.5	-16.7	-	-	-	-24.9	- 6.3	- 3.9	-25.3	-	-
10.	Eielson Field	-	-13.2	- 6.9	-10.3	- 3.5	- 6.4	-20.6	-10.7	-26.7	-16.4	-	- 7.9	8.2	-24.3	- 6.5	3.7	-25.1	-11.1	15
11.	Nome	2.8	5.6	9.6	8.8	10.0	6.2	- 5.1	6.2	- 3.4	- 3.6	6.3	- 7.1	20.0	- 5.5	0.9	15.4	- 2.5	3.3	17
12.	Lake Minchumina	-	-	- 5.0	- 7.0	- 3.0	- 3.4	-17.2	- 6.1	-22.0	-12.7	- 3.4	-12.2	9.1	-18.1	- 2.9	5.2	-21.4	- 8.0	15
13.	McKinley Park	- 3.7	- 1.7	- 3.6	- 3.0	- 9.4	6.1	-11.3	- 4.9	-10.4	- 8.5	2.2	-12.2	19.3	-13.0	3.5	17.7	-11.5	- 2.5	17
14.	Tok	-	-	-	-	-	-	-21.7	-15.5	-29.4	-18.1	-14.3	-10.8	- 4.1	-27.0	- 9.5	-10.8	-28.1	-	-
15.	McGrath	-12.8	-12.2	- 5.4	- 6.8	- 5.2	- 3.3	-19.1	- 8.5	-23.5	-15.3	-10.6	-12.1	7.4	-21.3	- 6.9	- 0.5	-21.7	-10.5	17
16.	Talkeetna	0.2	1.0	11.1	3.8	16.2	14.9	1.0	3.8	- 1.3	4.1	12.5	12.5	21.9	1.2	12.6	21.6	- 1.8	8.0	17
17.	Anchorage	5.8	6.8	12.1	10.8	17.7	17.9	6.0	8.1	4.3	9.4	15.4	18.0	25.2	4.2	16.6	24.8	2.7	12.1	17
18.	Valdez	13.8	15.7	20.9	15.2	22.7	22.0	15.1	17.2	15.4	17.4	19.9	22.2	26.8	13.5	23.3	23.1	13.7	18.8	17
19.	Bethel	4.6	6.4	8.9	10.9	2.2	8.5	- 5.0	6.0	- 6.4	- 3.7	8.2	- 7.6	19.2	- 5.1	2.8	15.0	- 3.0	3.6	17
20.	Iliamna	-	11.6	12.5	14.0	13.6	23.3	2.4	7.7	3.8	4.0	22.6	8.7	30.6	5.3	16.0	28.0	3.9	13.0	16
21.	Yakutat	19.7	23.1	30.3	23.2	33.1	32.3	24.8	20.4	25.6	28.0	30.9	32.7	34.9	25.1	30.3	32.3	15.8	27.2	17
22.	King Salmon	11.3	10.7	9.0	14.8	5.1	21.6	- 1.3	6.4	2.5	1.8	20.5	6.0	28.3	6.5	12.4	24.8	2.8	10.8	17
23.	Kodiak	-	29.5	30.8	31.8	30.2	33.7	24.2	29.1	29.2	25.8	33.6	27.5	37.2	26.1	32.3	32.3	27.2	30.0	16

Absolute Minimum for D e c e m b e r (°F)

	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	Mean Min.	Lowest Min.
1. Barrow	-31	-74	-39	-31	-35	-35	-45	-42	-45	-28	-42	-30	-40	-36	-25	-44	-35.7	-45
2. Wainwright	-33	-35	-36	-27	-	-36	-50	-41	-44	-39	-45	-34	-43	-32	-28	-40	-37.1	-50
3. Barter Island	-35	-38	-38	-34	-34	-36	-43	-43	-47	-35	-42	-40	-51	-31	-29	-43	-38.7	-51
4. Allakaket	-55	-55	-56	-46	-42	-69	-62	-57	-65	-57	-58	-48	-65	-	-	-	-56.5	-69
5. Kotzebue	-28	-25	-42	-15	-47	-37	-34	-35	-47	-33	-34	-14	-47	-31	-21	-40	-33.1	-47
6. Fort Yukon	-56	-40	-	-39	-31	-66	-55	-60	-53	-49	-48	-39	-65	-49	-	-	-51.5	-66
7. Tanana	-	-39	-49	-38	-23	-53	-53	-52	-48	-49	-45	-22	-64	-46	-21	-56	-43.8	-64
8. Fairbanks	-46	-31	-45	-30	-30	-54	-47	-50	-45	-47	-36	-25	-62	-41	-27	-56	-42.0	-62
9. Eagle	-59	-30	-46	-33	-32	-60	-56	-56	-44	-49	-38	-39	-61	-50	-	-65	-47.9	-65
10. Galena	-46	-35	-52	-30	-36	-50	-48	-47	-54	-	-	-	-62	-39	-14	-50	-43.3	-62
11. Eielson Field	-50	-33	-44	-26	-28	-53	-47	-48	-43	-	-30	-27	-61	-41	-27	-56	-40.9	-61
12. Nome	-23	-19	-22	-12	-22	-30	-34	-28	-35	-27	-29	- 1	-41	-25	-14	-31	-24.6	-41
13. Lake Minchumina	-	-32	-47	-30	-23	-50	-46	-48	-49	-44	-48	-16	-62	-39	-20	-59	-40.8	-62
14. McKinley Park	-32	-29	-31	-27	-17	-44	-36	-37	-41	-21	-47	-21	-52	-29	-17	-43	-33.5	-52
15. Tok	-	-	-	-	-	-60	-59	-66	-53	-46	-41	-38	-65	-57	-51	-70	-55.1	-70
16. McGrath	-49	-37	-49	-34	-29	-54	-52	-48	-53	-43	-31	-26	-67	-51	-26	-55	-44.0	-67
17. Talkeetna	-35	-26	-33	-11	-19	-34	-38	-39	-32	-27	-24	-15	-53	-32	-16	-39	-29.6	-53
18. Anchorage	-25	-16	-19	- 2	-13	-29	-27	-25	-20	-18	-12	- 9	-30	-19	- 1	-30	-18.4	-30
19. Valdez	-15	0	-10	6	- 1	-10	- 4	-13	- 6	- 4	3	9	-15	- 4	- 4	-15	- 5.2	-15
20. Bethel	-28	-26	-24	-28	-32	-46	-29	-31	-41	-20	-32	- 5	-34	-25	- 7	-31	-27.1	-41
21. Illiamna	-16	-20	-14	-18	- 7	-30	-18	-24	-28	-14	-17	9	-31	-10	0	-25	-16.4	-31
22. Yakutat	-15	12	- 3	7	5	- 8	-15	- 1	5	2	13	11	5	4	10	-24	0.5	-24
23. King Salmon	-21	-24	-22	-34	-15	-34	-23	-29	-32	-16	-25	- 4	-27	-20	-15	-22	-22.7	-34
24. Kodiak	18	14	15	13	17	5	9	11	3	14	3	24	9	11	24	5	12.2	3

Mean Daily Temperatures (°F) for J a n u a r y 1960

Days	Barrow	Wainwright	Barter Island	Kotzebue	Fort Yukon	Tanana	Fairbanks	Eagle	Kielson Field	Nome	Lake Minchumina	McKinley Park	Tok	McGrath	Talkeetna	Anchorage	Valdez	Bethel	Illiana	Yakutat	King Salmon	Kodiak
1	-32.5	-35.0	-31.5	-14.5	-31.5	-11.0	- 3.5	-13.5	- 4.5	6.0	- 6.0	1.5	3.5	1.0	22.5	24.5	18.5	18.0	32.5	32.0	31.0	37.5
2	-28.5	-29.0	-30.0	6.5	-29.0	- 6.5	1.5	-13.5	- 1.0	9.5	- 3.5	16.5	6.5	1.5	26.5	26.0	21.0	14.0	35.0	27.0	34.5	36.5
3	-17.2	-17.8	-22.5	5.0	-14.0	6.0	0.5	3.0	3.0	13.5	3.5	33.5	6.5	6.0	31.5	38.0	27.0	18.0	37.0	35.0	39.0	41.5
4	-14.0	-12.0	-22.0	23.5	1.0	15.0	13.5	5.5	23.5	27.5	14.5	38.0	7.5	21.0	36.5	39.5	31.5	30.0	35.5	38.5	33.0	39.0
5	-19.0	-16.5	-26.0	23.5	9.0	15.5	23.0	15.0	23.0	25.0	19.0	32.5	9.0	22.0	32.0	33.5	32.5	25.0	28.0	38.5	28.5	33.5
6	-10.0	-17.5	-24.0	17.0	5.5	11.0	13.0	2.0	18.5	29.5	17.0	1[illegible]	9.5	18.0	27.5	26.5	31.0	22.0	27.0	31.5	23.0	31.5
7	- 6.5	- 3.5	-12.0	17.0	2.5	1.0	15.5	10.0	15.0	20.0	11.0	1[illegible].0	5.0	10.5	18.5	22.5	19.0	20.0	18.5	20.5	26.0	29.5
8	-21.5	-14.5	-14.0	17.5	- 0.5	8.0	10.0	3.5	13.0	26.0	15.5	[illegible].5	- 8.5	20.0	14.0	19.0	12.5	25.5	28.5	19.0	32.0	35.0
9	-29.0	-31.5	-23.0	1.5	0.5	20.5	20.0	11.0	20.5	6.0	22.0	10.0	- 9.5	20.5	10.0	19.0	9.5	27.5	27.5	24.5	30.5	33.0
10	-27.5	-22.0	-36.0	-17.0	- 7.5	- 4.5	6.5	5.5	8.0	-13.5	4.0	4.0	-17.0	0.5	1.0	14.0	4.5	0.5	22.0	15.0	24.5	34.0
11	-21.0	-18.0	-35.5	-17.5	-15.5	-42.5	-19.5	1.5	-16.0	-19.0	-25.0	-10.5	-15.5	-32.0	-13.0	5.5	- 1.5	-23.5	4.0	17.5	6.0	29.5
12	-26.0	-18.5	-34.0	-30.0	-36.5	-55.0	-40.0	-13.0	-38.5	-13.0	-39.5	-30.5	-24.0	-42.5	-17.0	-13.5	1.5	-25.0	-12.0	25.0	-10.5	21.0
13	-32.5	-23.0	-34.0	-30.0	-53.5	-54.5	-47.0	-22.0	-44.5	- 7.0	-45.0	-20.5	-26.0	-48.5	-13.5	11.5	14.0	-27.5	-14.0	27.0	-14.5	19.0
14	-41.0	-30.0	-41.5	-31.0	-50.0	-54.0	-49.0	-17.0	-37.0	-13.5	-46.5	-27.5	-29.0	-47.0	-28.5	-13.0	12.0	-22.5	-10.0	21.5	4.0	24.0
15	-36.5	-30.5	-40.0	-33.5	-47.0	-38.0	-37.5	-31.0	-36.5	-23.0	-38.5	-21.5	-45.0	-37.5	-17.5	- 8.0	- 1.0	-25.5	14.0	14.0	20.0	29.5
16	-36.5	-37.5	-41.5	-30.0	-46.0	-14.5	-17.5	-17.5	-16.5	-18.5	-17.0	0.5	-36.0	-11.0	14.0	10.5	3.0	-11.0	28.5	20.5	28.5	33.0
17	-28.0	-31.0	-31.0	-20.5	-25.0	- 1.0	1.0	8.5	1.0	- 7.0	- 2.0	22.0	-15.0	- 2.0	22.0	22.5	23.5	- 2.5	29.5	29.5	26.5	35.0
18	-21.5	-22.5	-19.5	-21.0	-11.5	10.5	16.5	17.5	19.0	-17.5	9.5	29.5	- 3.5	14.0	28.5	27.0	21.0	0.5	37.5	28.0	36.0	38.5
19	-30.0	-28.5	-24.5	-24.0	- 6.0	13.5	8.0	22.0	8.5	-11.0	16.5	31.0	- 2.5	20.0	31.5	26.5	30.5	- 1.0	37.5	35.5	29.5	38.0
20	-33.5	-34.0	-24.0	- 9.5	- 3.5	13.5	13.5	9.0	13.5	- 4.0	18.5	29.5	- 0.5	21.5	29.0	28.0	23.0	- 3.0	35.5	28.5	31.5	36.5
21	-34.0	-37.0	-18.5	- 8.0	0	8.0	1.0	7.0	3.0	4.0	7.0	25.5	- 3.5	19.0	17.0	19.0	16.0	18.0	35.5	20.5	36.5	35.5
22	-31.5	-30.5	-19.5	6.0	1.0	7.5	- 8.5	9.5	- 5.0	26.0	- 2.5	17.5	- 4.5	14.5	16.5	17.0	12.0	33.5	34.5	17.5	36.0	33.0
23	-31.0	-28.0	-28.0	14.5	- 2.0	9.0	- 1.0	2.0	0.5	31.5	3.5	13.5	- 8.5	0.0	10.0	14.0	14.0	36.0	35.5	26.0	37.5	35.5
24	-20.5	-17.5	-36.0	22.5	- 4.5	6.5	0	0	1.0	30.5	2.5	8.5	-14.5	- 2.0	17.0	15.5	15.0	35.5	34.0	15.5	36.5	35.5
25	-16.0	- 9.5	-29.5	17.0	- 8.5	1.5	- 7.5	- 5.5	- 1.5	27.5	0.5	9.5	-14.5	0	9.0	13.5	17.0	30.8	28.0	17.0	28.5	30.5
26	-18.5	-19.0	-22.5	11.0	-19.5	- 4.5	-10.5	- 3.5	- 5.0	29.0	7.5	7.5	- 7.5	1.5	10.0	9.5	17.5	28.5	27.0	21.0	24.5	36.0
27	-10.5	-19.0	-27.5	0.5	-37.0	- 7.0	-11.5	-20.5	-11.5	26.0	5.5	2.5	-15.0	- 9.0	8.0	9.5	16.0	14.0	27.0	26.5	27.5	36.0
28	-18.0	-18.5	-26.5	- 6.0	-32.0	-15.0	-11.0	-35.5	- 4.5	13.0	- 1.5	- 4.5	- 5.0	-13.5	19.0	17.5	19.5	5.0	26.5	32.0	27.0	36.0
29	-27.5	-30.5	-27.5	-21.5	-35.5	-18.0	-16.5	-28.5	-12.0	- 5.5	-13.0	-13.5	3.0	-14.0	14.5	22.0	18.0	- 7.5	14.5	34.0	10.5	33.0
30	-25.0	-27.0	-24.0	-20.5	-20.0	- 9.0	- 8.0	-16.5	-11.5	-16.0	-10.5	- 0.5	- 7.0	-14.0	25.5	23.5	24.0	-20.0	16.5	39.5	[illegible].5	34.5
31	-24.0	-24.5	-17.5	- 3.0	- 9.0	- 4.0	8.5	-11.0	6.5	- 4.5	- 4.5	12.0	- 7.5	-10.5	32.5	36.5	29.0	-17.5	6.5	39.5	0	30.5

Mean Monthly Temperatures for January (°F)

		1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	Mean	No. of Years
1.	Barrow	-17.8	-13.1	- 3.3	-27.8	-15.5	-16.7	-16.9	-14.8	-17.6	- 4.3	-16.8	-17.3	-24.8	-11.0	- 2.4	- 9.0	-20.2	-14.6	17
2.	Wainwright	-	-11.6	- 0.1	-25.9	-17.4	-17.7	-23.1	-13.0	-16.4	- 1.8	-17.9	-17.9	-22.7	-11.2	- 2.3	- 7.2	-21.2	-14.3	16
3.	Barter Island	15.6	-12.2	- 6.9	-26.6	-15.4	-20.1	-16.8	-12.5	-	- 4.2	-18.1	-17.4	-27.3	-11.0	- 4.0	-10.6	-18.2	-14.8	16
4.	Allakaket	-	-	- 9.2	-	-	-35.1	-28.8	-14.9	-27.6	- 6.8	-15.0	-	- 6.5	-30.2	-13.1	-10.1	-	-	-
5.	Kotzebue	- 6.4	- 1.4	8.0	-16.4	- 9.7	-10.7	- 7.3	2.3	-12.9	7.2	- 8.0	- 3.8	- 5.0	6.6	- 1.8	10.3	- 6.9	- 3.3	17
6.	Fort Yukon	-	-30.8	-12.3	-33.7	-32.2	-36.8	-25.6	-18.0	-28.9	-10.7	-15.5	-35.7	-16.9	- 5.6	-11.3	-15.7	-	-21.3	15
7.	Tanana	- 4.4	- 9.3	-	-19.2	-16.6	-23.3	-16.0	- 2.4	-20.3	2.1	- 4.2	-15.2	- 6.2	- 0.2	- 9.4	- 4.8	-15.1	-10.3	16
8.	Fairbanks	- 4.4	- 8.3	- 1.0	-23.2	-15.4	-22.5	-14.6	- 3.2	-20.2	1.6	- 2.7	-20.9	- 3.8	- 2.0	- 7.8	1.7	-15.7	-10.0	17
9.	Eagle	-	- 9.3	-24.6	-25.6	-31.0	-24.0	-20.9	- 0.2	-24.8	-	- 2.3	-32.3	- 3.8	- 7.2	- 9.9	- 3.1	-22.9	-14.7	15
10.	Galena	-	- 7.3	- 0.2	-23.9	-19.0	-22.1	-14.5	- 2.2	-19.7	6.2	-10.1	-	-	-	-11.1	3.6	-14.5	-	-
11.	Eielson Field	-	- 8.9	- 2.1	-23.1	-22.8	-22.2	-15.0	- 2.7	-	1.7	- 2.6	-	- 2.2	0.7	- 8.1	1.5	-15.3	-	-
12.	Nome	1.9	5.4	13.1	- 6.7	1.7	2.3	- 1.0	13.3	- 3.8	14.3	1.4	6.4	5.9	14.8	3.4	20.3	2.8	5.6	17
13.	Lake Minchumina	-	- 7.2	-	-14.9	-11.6	-10.2	- 9.9	- 3.6	-14.4	4.4	0.4	- 8.3	- 2.8	4.1	- 2.7	2.3	-14.1	- 5.9	15
14.	McKinley Park	6.7	4.8	-	- 8.4	- 7.6	- 7.0	- 4.7	13.1	-11.6	10.8	8.2	-10.6	8.3	9.3	2.0	12.2	1.6	1.7	16
15.	Tok	-	-	-	-	-	-	-	-	-26.8	- 7.5	-10.1	-25.3	- 8.7	-12.5	-11.6	- 5.5	-20.2	-	-
16.	McGrath	- 4.1	- 8.8	- 1.3	-16.9	-18.6	-17.7	-13.7	- 0.9	-17.9	4.0	- 6.4	-12.0	- 2.0	- 1.7	- 9.7	3.8	-13.7	- 8.1	17
17.	Talkeetna	14.4	9.0	- 1.1	5.2	2.0	6.5	6.3	16.7	7.7	7.7	16.6	10.3	14.1	19.4	9.8	17.7	-	10.1	16
18.	Anchorage	18.0	12.6	5.1	5.1	3.8	6.9	9.8	18.2	5.1	15.0	18.6	10.1	17.0	20.9	13.5	19.2	14.1	12.5	17
19.	Valdez	23.7	20.4	17.5	11.8	9.8	12.4	18.0	21.0	17.1	15.7	20.7	11.9	17.2	23.7	23.4	22.8	20.7	18.1	17
20.	Bethel	4.6	6.5	13.1	- 3.6	2.3	0.2	- 6.5	14.5	- 4.3	16.8	2.0	3.3	7.0	11.1	0.8	19.6	4.9	5.4	17
21.	Illiamna	-	13.8	15.0	6.7	6.1	11.5	6.0	22.7	- 0.6	20.9	18.0	10.4	23.5	24.9	9.5	24.0	18.4	14.4	16
22.	Yakutat	30.4	24.5	12.4	22.6	17.3	22.7	22.6	31.1	24.7	23.9	32.2	24.0	26.5	31.7	26.8	30.9	29.1	25.5	17
23.	King Salmon	14.4	12.2	15.4	5.7	11.2	9.9	0.4	23.0	- 3.0	20.3	13.9	10.5	23.6	21.3	8.2	24.9	15.0	13.3	17
24.	Kodiak	-	28.6	34.7	25.2	28.1	28.9	29.4	32.6	26.1	32.8	32.4	31.5	33.3	35.0	29.9	34.1	31.6	30.9	16

Absolute Minimum for January (°F)

		1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	Mean Min.	Lowest Min.
1.	Barrow	-43	-33	-53	-47	-42	-48	-41	-52	-35	-44	-34	-45	-32	-39	-44	-49	-42.5	-53
2.	Wainwright	-45	-31	-50	-48	-46	-60	-44	-50	-41	-44	-38	-42	-35	-45	-42	-46	-44.1	-60
3.	Barter Island	-50	-45	-47	-38	-45	-43	-38	-	-38	-49	-38	-45	-31	-51	-44	-45	-43.1	-51
4.	Allakaket	-55	-52	-69	-66	-58	-57	-72	-58	-61	-65	-	-59	-48	-67	-60	-53	-59.9	-72
5.	Kotzebue	-36	-18	-40	-39	-33	-39	-36	-36	-46	-47	-25	-40	-24	-40	-32	-32	-35.2	-47
6.	Fort Yukon	-48	-55	-69	-66	-66	-59	-53	-61	-57	-55	-60	-63	-37	-60	-58	-	-57.7	-69
7.	Tanana	-42	-	-56	-54	-58	-49	-48	-52	-53	-36	-49	-58	-25	-55	-58	-45	-49.2	-58
8.	Fairbanks	-41	-31	-54	-56	-54	-48	-35	-53	-47	-30	-50	-51	-34	-52	-50	-42	-45.5	-56
9.	Eagle	-53	-55	-69	-71	-58	-64	-42	-61	-51	-44	-61	-43	-51	-63	-55	-55	-56.0	-71
10.	Galena	-48	-29	-64	-56	-50	-38	-49	-47	-49	-40	-	-	-	-54	-41	-43	-	-
11.	Nielson Field	-46	-36	-55	-56	-52	-47	-37	-51	-49	-33	-	-49	-31	-51	-51	-42	-45.7	-56
12.	Nome	-39	-17	-31	-30	-31	-32	-21	-30	-28	-28	-20	-35	-14	-30	-36	-25	-27.9	-39
13.	Lake Minchumina	-49	-	-52	-52	-52	-30	-34	-39	-43	-21	-44	-50	-24	-42	-48	-44	-41.6	-52
14.	McKinley Park	-31	-	-47	-44	-37	-38	-28	-42	-30	-27	-37	-38	-35	-45	-39	-30	-36.5	-47
15.	Tok	-	-	-	-	-	-	-	-61	-51	-36	-63	-52	-49	-69	-58	-55	-	-
16.	McGrath	-53	-32	-58	-57	-59	-45	-45	-43	-38	-39	-41	-35	-37	-52	-56	-44	-47.1	-59
17.	Talkeetna	-39	-28	-41	-37	-29	-23	-21	-28	-25	-19	-30	-39	-18	-26	-27	-	-28.6	-41
18.	Anchorage	-25	-17	-32	-28	-19	-22	- 8	-21	-10	-13	-17	-23	- 6	-22	-22	-16	-18.8	-32
19.	Valdez	- 8	- 8	-24	-15	-10	- 5	-10	-16	-11	0	-14	0	- 1	- 7	-12	-14	- 9.3	-24
20.	Bethel	-44	-14	-45	-32	-33	-42	-38	-28	-31	-29	-21	-33	-20	-30	-32	-26	-31.1	-45
21.	Iliamna	-28	- 5	-29	-28	-22	-24	-30	-27	-15	-15	-19	-20	- 4	-25	-22	-14	20.4	-30
22.	Yakutat	-14	-13	- 4	-22	0	-30	9	- 1	4	1	0	4	5	- 3	2	2	- 2.5	-22
23.	King Salmon	-38	- 7	-39	-19	-21	-35	-25	-29	-11	-22	-24	-19	- 6	-28	-30	-28	-23.8	-39
24.	Kodiak	5	21	6	9	11	15	15	7	19	9	12	15	21	10	3	14	11.9	3

Mean Daily Temperatures (°F) for F e b r u a r y 1950

Day	Barrow	Wainwright	Barter Island	Kotzebue	Fort Yukon	Fairbanks	Eagle	Galena	Bettles Field	Nome	Lake Minchumina	McKinley Park	McGrath	Tanana	Anchorage	Valdez	Bethel	Illiamna	Yakutat	King Salmon	Kodiak
1	6.0	9.5	6.5	- 2.5	- 1.5	4.0	-12.0	5.0	3.5	10.0	4.5	12.0	3.5	- 2.5	11.5	15.5	14.5	17.5	29.5	17.5	30.0
2	-15.5	-16.0	- 9.0	-12.5	- 2.5	- 7.5	0	-13.0	- 6.0	- 9.0	-15.0	- 1.0	-12.0	3.5	12.0	20.0	- 8.0	4.5	27.5	- 0.5	26.0
3	-27.5	-25.5	-21.5	-16.5	-28.5	-29.5	-16.5	-27.0	-32.5	6.0	-30.0	-11.0	-20.5	9.5	12.5	15.0	-16.0	0.5	22.0	- 1.5	18.5
4	-17.0	- 5.5	-37.0	- 5.5	-38.5	-38.0	-43.0	-19.5	-39.5	10.0	-31.0	-14.5	-25.0	9.0	13.0	14.5	- 2.5	- 1.0	14.5	3.0	23.0
5	-10.5	7.0	-38.5	- 9.5	-47.0	-39.5	-49.0	-18.0	-37.5	6.0	-35.5	-22.0	-23.0	- 4.0	- 1.0	11.0	10.0	- 0.5	8.0	7.0	21.5
6	-17.0	-11.5	-21.0	- 5.0	-47.5	-39.0	-53.5	-24.0	-39.5	8.0	-32.5	-19.0	-26.0	- 8.5	- 6.0	7.0	-11.0	- 7.5	5.0	- 3.5	18.0
7	-18.5	-27.5	-13.5	-10.0	-43.0	-37.0	-45.0	-22.5	-38.5	10.5	-18.5	-26.0	-28.0	- 3.5	- 7.0	4.5	-14.5	-15.5	20.5	-11.0	14.0
8	-21.5	-29.0	-23.0	-17.5	-44.0	-35.5	-50.0	-24.0	-34.0	-12.0	-17.0	-26.5	-25.5	2.5	- 4.5	6.5	- 9.0	-13.5	23.0	-10.5	21.5
9	-27.5	-35.5	-32.0	-16.5	-48.0	-34.5	-50.0	-29.5	-35.5	-10.5	-26.5	-18.5	-29.0	- 2.0	- 4.0	6.5	- 9.0	- 9.0	22.0	- 5.0	27.0
10	-38.0	-35.5	-39.5	-16.0	-46.0	-36.5	-54.5	-24.5	-39.0	-10.0	-12.5	-24.5	-26.5	5.5	- 2.5	8.0	-11.5	-12.5	15.5	- 9.5	19.0
11	-46.5	-41.0	-55.0	-17.5	-43.5	-35.0	-56.0	-30.0	-41.0	- 9.5	-20.5	-25.0	-27.5	3.0	- 7.0	6.5	-10.0	-12.0	19.0	- 8.5	17.5
12	-29.0	-36.5	-54.5	-24.5	-45.0	-37.5	-58.0	-30.0	-41.0	-18.5	-26.5	-34.5	-23.5	10.5	4.0	11.0	-13.0	-11.0	35.0	-15.0	17.5
13	-24.5	-19.5	-39.5	-27.5	-49.0	-41.0	-31.0	-32.5	-41.0	-16.5	-20.5	-29.0	-18.5	14.0	20.0	18.5	-11.5	-11.5	30.0	-10.0	24.0
14	-36.5	-29.5	-42.5	-20.5	-47.0	-40.0	-30.0	-33.5	-41.5	- 8.5	-17.0	-20.5	-26.5	10.5	5.0	16.0	-11.0	- 7.5	23.0	- 1.5	22.0
15	-35.5	-31.5	-48.5	-22.0	-47.0	-33.5	-36.0	-34.5	-37.5	- 7.5	-14.5	-15.5	-26.5	7.5	1.5	14.0	-12.0	- 9.5	25.0	- 4.5	19.5
16	-10.5	- 8.0	-44.5	-14.0	-45.0	-26.0	-48.0	-31.5	-32.0	-13.0	- 7.0	-23.5	-21.0	10.0	3.0	11.5	- 8.0	- 6.0	26.5	- 7.5	24.5
17	- 3.5	6.0	-35.0	-13.0	-42.0	-23.5	-45.5	-26.5	-27.5	- 6.5	- 3.5	-18.0	-18.5	14.5	3.5	12.0	- 4.0	- 9.5	24.0	-10.5	23.5
18	- 3.5	- 5.0	-35.0	- 4.5	-35.5	-17.0	-38.5	-24.5	-19.5	- 4.5	1.0	- 7.5	-18.5	4.0	9.5	13.0	-13.0	- 6.0	30.0	- 9.5	22.0
19	-22.0	-19.0	-36.0	-11.0	-34.5	-14.0	-30.5	-23.5	-15.0	-12.0	- 0.5	- 9.0	-14.5	2.5	7.0	13.0	-11.5	- 6.0	30.0	- 9.0	22.0
20	-14.5	-13.0	-27.0	-10.5	-30.5	-14.5	-17.5	-24.0	-15.0	- 6.0	- 9.0	2.0	-14.5	8.5	12.0	19.5	- 4.0	11.0	31.0	9.5	24.0
21	-28.5	-15.0	-24.5	- 8.5	-30.5	-15.0	- 3.5	-21.0	-14.0	- 3.0	-10.0	0.5	-12.0	14.0	18.5	20.0	0	19.5	32.0	17.0	30.0
22	-23.0	-15.0	-24.5	- 2.0	-19.5	-11.5	-10.5	- 2.5	-11.5	9.0	- 1.0	- 8.0	- 8.5	18.5	20.5	20.5	2.5	15.5	32.0	14.0	28.5
23	-33.5	-32.0	-41.5	- 1.0	-11.0	3.5	- 9.0	- 1.0	1.5	5.0	- 1.0	-12.0	- 5.0	18.5	16.5	25.0	7.0	18.5	33.5	19.0	33.0
24	-36.5	-40.0	-38.5	-10.5	-12.5	- 7.5	- 9.5	- 7.5	- 6.5	2.5	- 4.0	-15.0	-10.5	12.0	13.0	26.5	3.5	11.5	35.0	11.0	32.5
25	-30.5	-41.0	-43.0	-15.5	-17.5	- 8.0	- 9.0	-15.5	- 9.5	- 1.5	- 4.0	-15.0	-14.0	17.5	14.5	19.5	0	8.5	33.5	10.5	33.0
26	-38.5	-39.0	-45.5	- 8.0	-18.0	- 8.5	- 7.5	-14.5	-11.0	4.3	- 4.5	- 6.5	-15.0	21.5	18.0	22.0	10.5	15.0	32.0	16.5	30.5
27	-28.5	-35.5	-37.0	5.5	-26.0	- 6.5	-23.5	- 5.0	- 7.0	16.5	- 5.5	8.5	-10.5	27.5	23.0	30.0	19.0	21.5	27.5	15.0	34.5
28	-21.5	-25.0	-32.0	7.5	-23.0	1.0	-16.0	- 4.5	- 2.5	20.0	- 1.0	16.0	- 6.5	28.5	19.0	26.0	11.0	31.0	29.5	29.5	35.5

Mean Monthly Temperatures for February (°F)

		1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	Mean	No. of Years
1.	Barrow	-11.2	-19.6	-23.8	-21.9	-21.8	-20.3	-23.5	-26.3	-27.5	-25.0	-16.7	- 8.5	- 8.3	-26.9	- 5.9	-16.8	-28.6	-19.6	17
2.	Wainwright	-	-	-21.8	-23.5	-23.4	-28.4	-	-26.0	-28.4	-23.0	-18.4	- 7.8	- 7.6	-27.8	- 6.6	-17.0	-31.0	-	-
3.	Barter Island	-10.4	-20.8	-33.4	-21.9	-26.4	-18.4	-19.0	-26.4	-26.2	-24.0	-26.0	- 5.8	- 8.8	-26.1	- 4.9	-13.5	-24.5	-19.8	17
4.	Allakaket	-	-	-	-	-13.2	- 8.0	-32.8	-	-17.9	-	-13.6	1.4	- 5.1	-27.5	- 0.5	-11.4	-16.9	-	-
5.	Kotzebue	- 6.4	- 5.6	-11.1	- 8.4	- 4.4	- 6.2	-14.8	-19.9	-11.5	- 5.7	2.1	6.0	1.9	-12.9	7.0	0.2	-21.2	- 6.5	17
6.	Fort Yukon	-	-21.0	-33.0	-24.4	-33.9	- 8.2	-23.1	-24.8	-19.4	-13.6	-14.2	- 4.6	- 6.3	-16.7	- 3.7	- 8.5	-	-15.7	15
7.	Tanana	-11.4	-10.4	-	- 8.6	- 3.2	- 6.6	-18.8	-17.1	-15.3	- 6.4	- 1.9	2.0	3.7	- 7.6	4.7	- 2.0	- 5.8	- 6.5	16
8.	Fairbanks	- 6.6	- 9.1	-22.5	- 7.6	- 2.5	2.6	-16.9	-12.3	-10.6	- 2.6	1.4	5.9	3.0	- 4.4	7.1	- 0.3	0.7	- 4.4	17
9.	Eagle	-	-16.0	-30.0	-10.5	- 3.0	7.3	-15.4	-11.0	-11.2	- 8.7	-12.3	2.2	1.7	-13.4	2.7	- 1.3	5.2	- 7.0	16
10.	Galena	-	-10.6	-20.0	- 9.6	- 6.1	- 3.7	-16.3	-18.7	-12.2	- 4.6	- 2.3	-	4.9	-	8.3	- 0.6	- 7.1	- 7.0	14
11.	Bielson Field	-	- 9.5	-23.9	- 7.5	- 5.5	3.5	-15.9	-12.5	-10.5	- 3.6	1.2	-	4.7	- 4.0	6.7	0.7	2.1	- 4.9	15
12.	Nome	0.6	0.8	- 3.3	5.8	3.2	4.2	- 8.9	- 5.8	- 4.3	4.6	13.6	14.1	11.1	- 2.4	16.2	11.1	- 8.1	3.1	17
13.	Lake Minchumina	-	- 5.0	-13.0	- 2.2	- 2.0	- 0.4	-13.0	- 9.7	- 7.4	- 1.4	7.3	10.1	5.1	- 1.7	8.6	2.9	- 0.6	- 1.4	16
14.	McKinley Park	2.8	- 0.4	-13.0	2.0	7.2	10.4	- 6.2	0.4	- 0.5	5.7	6.9	15.6	16.2	0.1	15.1	11.7	5.2	4.7	17
15.	Tok	-	-	-	-	-	-	-	-	-12.6	- 5.1	- 7.1	2.0	6.5	- 7.7	1.9	2.9	7.9	-	-
16.	McGrath	- 5.2	- 8.4	-18.0	- 3.1	- 0.9	1.1	-14.5	- 8.9	- 8.3	- 3.0	2.4	10.6	4.6	5.4	9.3	1.1	- 0.6	- 2.8	17
17.	Talkeetna	8.0	1.4	9.0	8.3	17.6	18.3	3.2	11.6	6.9	10.7	20.1	17.7	20.5	14.4	16.4	23.1	14.0	13.0	17
18.	Anchorage	12.2	6.0	7.5	13.2	18.6	20.4	6 7	15.4	10.3	13.5	19.1	20.8	22.7	17.9	19.5	23.5	20.1	15.7	17
19.	Valdez	16.2	12.6	15.5	17.5	22.3	24.9	15.8	21.5	16.1	21.9	23.3	23.8	25.1	23.2	24.3	29.4	25.5	21.1	17
20.	Bethel	6.2	1.2	- 3.7	12.2	5.5	7.4	- 9.0	0.2	- 0.1	8.4	13.2	20.6	12.5	- 5.1	19.2	11.0	- 1.2	5.8	17
21.	Illiamna	-	8.8	1.3	17.0	17.0	15.6	1.2	12.5	8.8	16.2	23.7	24.8	25.0	7.8	23.3	19.5	14.1	1/.8	16
22.	Yakutat	21.7	16.4	25.7	23.9	29.0	33.0	23.0	28.3	23.4	26.8	31.0	28.0	33.6	30.4	27.2	35.7	32.7	27.6	17
23.	King Salmon	10.1	9.1	1.9	20.0	15.7	15.8	- 3.6	12.7	6.0	14.2	23.7	25.8	22.8	4.4	23.5	18.2	14.4	13.8	17
24.	Kodiak	-	-	24.7	32.0	31.0	31.1	25.5	30.2	25.9	31.0	37.4	35.3	35.1	28.9	34.7	-	30.5	-	-

Absolute Minimum for F e b r u a r y (°F)

		1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	Mean Min.	Lowest Min.
1.	Barrow	-51	-50	-53	-36	-43	-48	-50	-44	-50	-34	-38	-32	-43	-33	-44	-54	-43.9	-54
2.	Wainwright	-	-50	-47	-42	-55	-	-54	-51	-54	-34	-40	-33	-43	-36	-46	-56	-45.8	-56
3.	Barter Island	-43	-59	-46	-44	-47	-45	-48	-47	-51	-47	-34	-35	-43	-33	-35	-48	-44.1	-59
4.	Allakakec	-58	-	-58	-52	-61	-70	-64	-60	-65	-50	-41	-40	-49	-55	-60	-60	-	-
5.	Kotzebue	-34	-32	-34	-31	-38	-43	-47	-45	-46	-18	-23	-33	-33	-27	-29	-60	-35.8	-60
6.	Fort Yukon	-52	-63	-56	-46	-64	-56	-64	-60	-58	-48	-38	-42	-45	-42	-55	-	-52.5	-64
7.	Tanana	-46	-	-40	-31	-62	-50	-47	-57	-56	-27	-25	-32	-34	-43	-53	-55	-44.0	-62
8.	Fairbanks	-46	-52	-43	-31	-52	-50	-45	-50	-47	-28	-20	-29	-32	-37	-46	-39	-40.4	-52
9.	Eagle	-52	-66	-54	-38	-53	-58	-59	-62	-61	-47	-27	-36	-52	-44	-58	-41	-50.5	-66
10.	Galena	-48	-45	-49	-40	-51	-45	-47	-52	-47	-29	-	-31	-	-35	-48	-47	-43.9	-52
11.	Eielson Field	-46	-53	-43	-35	-50	-45	-46	-52	-49	-30	-	-26	-27	-34	-41	-40	-41.3	-56
12.	Nome	-42	-26	-29	-34	-31	-36	-33	-37	-37	-15	-19	-31	-22	-22	-13	-37	-29.0	-42
13.	Lake Minchumina	-40	-44	-39	-28	-54	-47	-43	-51	-43	-11	-13	-23	-27	-30	-46	-37	-36.0	-45
14.	McKinley Park	-30	-40	-29	-19	-39	-39	-34	-37	-39	-21	-12	-16	-28	-23	-35	-37	-29.9	-40
15.	Tok	-	-	-	-	-	-	-	-55	-55	-44	-25	-28	-44	-45	-60	-43	-	-
16.	McGrath	-43	-49	-42	-26	-52	-50	-51	-55	-44	-26	-22	-35	-35	-35	-47	-46	-41.1	-55
17.	Talkeetna	-42	-25	-34	-38	-58	-34	-35	-40	-24	-10	-15	- 9	-15	-31	- 5	-38	-27.1	-42
18.	Anchorage	-27	-21	-19	- 8	-12	-25	-18	-26	-12	- 1	- 4	4	0	-10	- 4	-22	-12.8	-27
19.	Valdez	-18	1	-10	- 5	- 8	- 9	- 3	-17	- 2	3	6	2	6	- 2	2	3	- 3.2	-18
20.	Bethel	-38	-24	-34	-31	-35	-39	-37	-38	-25	- 9	-18	-31	-23	-26	-16	-35	-28.7	-39
21.	Illiamna	-24	-22	-12	-17	-31	-49	-24	-30	-19	- 3	- 4	- 8	-17	-19	-14	-28	-20.1	-49
22.	Yakutat	19	- 5	-14	- 5	11	- 8	3	- 8	11	9	- 1	14	8	6	13	17	4.4	-14
23.	King Salmon	-25	-19	-10	-21	-34	-40	-38	-33	-21	- 2	- 6	-27	-19	-22	- 9	-26	-21.4	-40
24.	Kodiak	-	12	18	19	7	11	9	8	3	28	22	15	11	12	-	11	-	-

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The circulation patterns and synoptic processes associated with periods of very low temperatures in Alaska were examined from the view point of Synoptic climatology.

The study is based mostly on monthly and daily temperature data obtained from meteorological stations in Alaska during the period 1948 - 1964 /5/, /6/, and upon analysis of the synoptic charts presented by the Polar Weather Maps publication, U. S. Weather Bureau /4/.

Individual months, with extremely low mean monthly temperatures were selected for detailed analysis from series of observations within the above mentioned period. These months were: December 1957, January 1960, and February 1950.

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